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# Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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14 January 1985

**WORLDWIDE REPORT  
NUCLEAR DEVELOPMENT AND PROLIFERATION**

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PEOPLE'S REPUBLIC OF CHINA

ARTICLE CONCLUDES THAT CHINA SHOULD FOLLOW WORLD DE-EMPHASIS OF NUCLEAR POWER

HK050941 Beijing SHIJIE JINGJI in Chinese No 9, 10 Sep 84 pp 35-39

[Article by Yang Haiqun of the Economic Institute of the State Planning Commission: "On the Decline of the World Nuclear Energy Industry"]

[Text] In the United States, there is a Worldwatch Institute, funded by many different organizations, which studies questions of global strategy. The institute's director, Chester Brown visited China this year. In his speech at the International Club on 19 April, he pointed out: "As China enters the era of nuclear power use, it should be very careful, because from its experience with nuclear energy, the United States has come to feel that it has the problem of being uneconomical, and nuclear power station construction is running into problems in countries all over the world, including Japan and France, whose programs have gone ahead relatively fast. No nuclear power stations have been ordered in the United States since 1976. It should be realized that not only has nobody purchased a nuclear power facility for the last 8 years, but nobody will do so ever again in the United States. This is by no means a response to the wrath of environmental specialists, nor is it due to a lack of governmental support, but the result of market factors. If you were a power specialist and called people on Wall Street to discuss the issue of nuclear power station construction, I'm afraid nobody would even attend the meeting."

Relevant data confirms that Brown's words reflect from the American side a worldwide decline in the nuclear energy industry.

1. Cutbacks in World Nuclear Energy Project Plans

In 1979, the OECD estimated that by 1985, its U.S. and European members plus Japan would possess 563,000 megawatts of nuclear energy generating capacity, representing about half of the total power generating capacity of these countries. Since 1970, however, the nuclear power generating capacity of OECD member states has been cut by two-thirds of the original plan. Today, nuclear power stations now in operation represent less than half of the number initially estimated. Present estimates for 1990 show that the scale of the nuclear power industry is now no more than one-third of what it was planned to be in the past.

Japanese specialist on nuclear energy and the Middle East question, Shigeki Koyama, used the table of the Japan Nuclear Energy Industry Conference in April of this year to show the cancellations of nuclear reactors in the United States: from 1972 to 1983, a total of 103 atomic reactors were cancelled in the United States, representing a net cut of 117,859,000 kilowatts of generating capacity. The United States was the first to develop nuclear energy, and its cutbacks have also been the biggest. The U.S. Congress Technology Evaluation Bureau published on 7 February of this year a survey report entitled "Atomic Energy Which Does not Define the Age", in which it pointed out that: "If no great changes take place in such aspects as technology, management, and popular attitudes, it will be unrealistic to expand the atomic energy program beyond projects already under construction."

Table 1: Table of cancelled atomic reactor contracts in the United States  
(units: 10,000 kilowatts pulse generating capacity)

	<u>No of Plants</u>	<u>Generating Capacity</u>
1972	6	586.1
1973	-	-
1974	8	871.9
1975	11	1,257.8
1976	2	242.3
1977	9	1,027.9
1978	13	1,395.3
1979	8	986.5
1980	16	1,877.6
1981	6	611.1
1982	18	2,303.6
1983	6	625.3
TOTAL	103	11,785.9

Source of statistics: Japan Atomic Energy Industry Conference "An Overview of Atomic Energy Power Stations" (effective to 31 Dec 1983)

Over the past few years, U.S. nuclear power stations have been in a highly depressed state, and the nuclear fuel of the Energy Department has not found any buyers. At present, the Nuclear Energy Department is cutting prices and production, and delaying plans for expanded production of nuclear energy totalling several billion U.S. dollars. Its fuel enrichment plants are at present working at less than half capacity. Since 1978, there has been not one single order for a nuclear power station. Other statistics state that during the past 9 years, only two nuclear power stations ordered have not been cancelled; some have been abandoned after only 10 or 20 percent of the construction was completed, while in 1982 alone, reactors were abandoned which had already consumed as much as \$5.7 billion in investment, bringing the total investment figure for abandoned nuclear power stations to \$10 billion. Meanwhile, from 1975 to 1983, U.S. coal-fired power plants increased capacity by 58,000 megawatts.

Outside the United States, the public corporations of the majority of other countries have also made large-scale readjustments in their nuclear energy plans. Since 1978, the commissioning of nuclear power facilities has only increased at 10 percent, almost all in France. There has been very little increase in either Britain or Federal Germany; while there has been a drop in Spain, Sweden, Switzerland, and Italy. In 1983, a high-level French Government commission published a long-term research report stating that by 1987, France would not commission any more new nuclear power stations. In Japan, whose reactor technology is now the most advanced in the world, the nuclear generating capacity goal for 1995 has now been reduced by 13,000 megawatts, and there are indications that it is slowing down the schedule of the nuclear energy program. The Soviet Union has also slowed down the development of its nuclear energy, and according to reports, the Soviet Union is still 6,000 megawatts off reaching its present 5-year plan target. According to present plans, by 1990 the developing countries will possess no more than 20,000 megawatts of nuclear generating capacity, or only one-seventh of what the IAEA predicted in the early 1970's. Taiwan Province, which actively developed nuclear power stations in the 1970's, had slowed down its rate of development by 1982, and had delayed the construction of several reactors indefinitely. By the early 1980's, South Korea had also decided not to commission any further nuclear power stations.

## 2. The Rise and Fall of the Nuclear Energy Industry

From 1951 and 1954, when the United States and the Soviet Union respectively began construction of small-scale reactors, until the 1960's, the nuclear power industry was in the experimental stage. During this period, only the United States and the Soviet Union invested in nuclear power stations, and though several other industrial nations had their own plans, they were all hindered by the Soviet-American monopoly. In the mid-1960's, the nuclear energy industry entered the stage of commercial growth. Not only did U.S. power plants increase many times over, but U.S. corporations, guided by governmental plans, began to sell nuclear technology to Europe, Japan, and some developing countries. The oil crisis of 1973-1974 pushed the development of the nuclear industry to a high wave, and during those 2 years U.S. corporations were involved in the construction of 126 nuclear power stations. Between 1971 and 1974, a total of 200 such stations were commissioned throughout the world. But as soon as this high wave had passed, the industry entered its fourth stage of slowed development. The United States was the first to cut its nuclear energy program, while many other countries reduced theirs to varying extents. Even so, by late 1983, there were 282 commercial nuclear power stations in 25 countries, with a generating capacity of 173,000 megawatts, able to provide around 9 percent of the entire world's electricity needs, or 3 percent of all energy needs. The proportion of nuclear energy in overall energy generation has differed widely in the various industrial nations: 40 percent in France; 17 percent in Japan; 13 percent in the United States; and 6 percent in the Soviet Union. However, the picture of nuclear energy industry development was an extremely dismal one. According to a survey produced by the U.S. Worldwatch Institute, the industry will have entered a period of complete stagnation by the latter part of the 1980's. The sketch drawn by Shigeki Koyama in Japan's "World Report" makes

it clear that between 1972 and 1983, commissioning of atomic reactors in the United States, Britain, France, West Germany, and Japan showed a tendency to drop; while plans for new construction of reactors between 1984 and 1991 showed a sharp drop.

### 3. The Reason for the Decreased Rate of Development in the Nuclear Energy Industry

The situation differs in each country, and reasons are manifold. Nuclear energy has met a series of unsolved problems, including the safety problem, the problem of handling nuclear waste, and the decommissioning of nuclear plants. But the main reason for the decline in the nuclear energy industry has economic roots. For example:

1. The nuclear energy industry is a highly capital intensive industry, with high construction costs. There is a long period from the design to the operation stage, during which high capital investment is required, investment which has become the number one detrimental factor in public investment budgets over the last few years. Ever since the first commercial nuclear power station went into construction in the early 1960's, capital estimates for U.S. nuclear power stations have risen steadily. Since the mid-1970's, cost estimates for private nuclear power plants have doubled every 4 years, faster than the price of gasoline, housing, or any other main item of expenditure. For the reactors built in the United States in the early 1980's, each kilowatt of electricity required an average investment of \$2,000 (at 1982's dollar rate), over 100 percent higher than coal-fired power stations. Its high costs and long construction period make a nuclear power station three times as expensive in terms of fund raising requirements as a coal-fired power station, and increases average construction expenses by about \$500 million. "Success stories" of nuclear power station construction are very few, with the ones which have been successfully completed having difficulties with expenses exceeding the budget, and the appearance of phenomena which would be seen in any other industry as losing operating capacity. In the United States, investment in nuclear energy construction has risen from \$2 billion in 1970 to \$19 billion in 1982, representing a three-fold increase even after deductions for inflation have been taken into account. Yearly overspending is comparable to the total budget of many other countries. Data from public utilities corporations in Japan show that actual yearly construction costs in Japan rose from \$350 per kilowatt in the early 1970's to \$1,000 per kilowatt in the early 1980's (at the 1982 U.S. dollar rate). Japanese nuclear energy experts have pointed out that nuclear power station construction costs are getting increasingly high, and that their inflation rate is not only higher than the inflation rate of goods prices, but also higher than the inflation rate of construction expenses for power stations powered by oil and other fuels. Britain's Central Electricity Board has admitted that the cost of its recently-constructed air-cooled nuclear power plant is equivalent to twice the cost of constructing a coal-fired power plant. West Germany has a larger and more successful nuclear energy program than that of Britain, but there are huge cost problems involved in it. Official figures gathered by West Germany's largest public utilities corporation shows that from 1969 to 1982, direct nuclear energy construction costs increased 600 percent, while costs for fuel-fired power stations rose only

350 percent. The Freibourg Institute's 1983 research report points out that due to rapid increases in construction costs and interest rates, construction costs for nuclear power are at least 60 percent higher than those for coal-fired power. In a recent 5-year plan report, Soviet officials announced figures showing that construction costs were 80 to 100 percent more for nuclear facilities than for coal-fired facilities. According to the builders of Canada's heavy water uranium reactor nuclear power stations, construction costs have risen from \$400 per megawatt in 1972 to \$1,700 per megawatt in the early 1980's which even after deductions to compensate for the inflation rate, mean an average annual rate of increase of 6 percent.

Now, the ribbon-cutting ceremony for a new nuclear power station often becomes a symbol showing that the world has entered a new stage which will push electricity expenses up 30 to 50 percent.

2. The operating costs of such stations are also high. In the 1970's, the operating and maintenance costs for U.S. nuclear power stations rose at an average annual rate of 18 percent. By the early 1980's, average annual running costs exceeded \$30 million, increasing the cost of producing the electricity by 20 percent. The various stations operate at an average of less than 60 percent of their standard capacity, rather than at 75-80 percent as had been imagined; this has also proved damaging to the economic efficiency of U.S. nuclear power stations. Many stations, due to a series of technical problems, are only semi-operable, frequently having to shut down for repairs. And due to the fact that construction expenses accounts for two-thirds of the cost of a nuclear power station, whether or not the station is in operation, the construction fees have already been paid; and a low utilization rate will mean a massive increase in generating cost. Overspending is frequently the main subject for discussion at meetings of boards of directors and commissions of inquiry. Detailed analysis and planning of over 30 U.S. nuclear power stations to be completed by the mid-1980's has shown that the electricity they produce will cost an average of 10 to 12 cents per kilowatt-hour (at the 1982 dollar rate). This is 65 percent higher than the cost of coal-fired generation, and 25 percent higher than oil-fired generation. Data provides thorough proof that in the United States, nuclear power stations are no longer a worthwhile proposition. Difficulties encountered in production technology and organization in the Soviet Union and other countries, including labor management and delays caused by builders and suppliers, has also slowed down the rate of development. The Soviet authorities have already admitted the existence of the problem of massive overspending on nuclear power stations. France's nuclear power construction program is famous throughout the world for its efficiency and speed, but since 1982, many French nuclear power stations have not produced good profits from operation, and costs may rise. France's nuclear energy program has become a massive burden on the capital market, and Electricite Francais has been forced to reschedule debts and to borrow money widely from the European bond market to maintain its existence. In 1982, the company's director pointed out that public utilities were in their worst financial state in 30 years. Overspending has also become an acute problem for Japan's nuclear power stations, which have had to shut down at various times for repairs, and often face the threat of earthquakes. The first of the Philippines' nuclear power stations was built on an earthquake

faultline, and can only maintain production through constant seismic testing which delays operation and leads again to overspending. The situation in India's nuclear power station operation is also bad, and the Indian Government has admitted that nuclear power generation is much more expensive than coal-fired power generation. In short, overspending in successive years on nuclear power stations has meant that for the majority of countries, the nuclear industry has no economic attraction whatsoever.

3. The costs for decommissioning and waste disposal for nuclear power stations are increasing steadily. On the one hand, the problem of nuclear waste (including waste nuclear fuel and damaged rods) is extremely difficult to handle, and transportation costs are high; and on the other hand, there is the problem of costs for decommissioning old plants. For example, some nuclear power plants in the United States have been decommissioned after reaching a certain stage of construction, and this had cost a total of \$14 billion by the end of last year. Investors on Wall Street have two bills for nuclear power stations, one for building expenses, and the other for decommissioning. To this day, nobody is clear on the size of the latter bill. No wonder London University professor J.W. Jeffrey stated that "nuclear energy was never economical, is not economical now, and will be even less economical in the future."

4. The long-term economic stagnation in Western nations and the reduced plans of some developing countries forced by serious debt crises have reduced the electricity demands of these countries, and increased the risk of nuclear power project investments. The rate of increase of the United States' energy needs has dropped from the 7 percent of 10 years ago to today's 1 to 3 percent; in France, the rate of increase in demand for electricity has slowed since the late 1970's, and in 1982 the French Government decreased its estimate for the country's electricity increase for the 1980's by 50 percent. This means that by 1990, France will have at least 13 percent surplus energy generating capacity. The majority of public utilities companies have no way of predicting correctly what effect this massive change will have, and have no choice but to be circumspect in drawing up future plans.

Though France has begun to experience an economic recovery since last year, many economists have recently pointed out that the United States, which began its economic recovery first, has begun to slow down. Economic growth in other countries is also highly unbalanced. Even in a situation of strong economic recovery, high interest rates and tight money markets are unlikely to change. In a situation of high interest rates and low share prices, companies deficient in funds, in order to complete their plans, will make efforts to raise funds. But people will begin to go against purchasing shares in these companies, and many companies will be terrified of investing in nuclear power stations. A certain management bureau chief who used to have the biggest plans in the United States for nuclear power construction said: "Nuclear power costs are not only high, but are difficult to estimate. No capitalist with any wisdom will plan to carry out a construction program on a project which he doesn't know how much it will cost, and therefore cannot possibly estimate its cost-effectiveness." The U.S. Congress Technology Evaluation Bureau has pointed out that "due to the fact that future energy needs are difficult to estimate, the fact that equipment investment costs are

too high, that there are many operation and management problems, legal restrictions are constantly being strengthened, and there is steadily rising opposition from the people, atomic energy in the U.S. now presents many investment risks." The OECD Atomic Energy Board, which used to have a highly optimistic attitude, came to the conclusion in 1982 that "in an atmosphere of change and uncertainty in the market, the nuclear energy industry now faces the danger of being commercially unviable." Many countries, in order to avoid repeating the same mistakes as the United States, cannot but adopt a highly cautious attitude.

5. Developing countries also face certain special difficulties in carrying out a nuclear power program. One important barrier to the development of nuclear energy in the countries and regions of the Third World is that their power networks are very small-scale. The IAEA has estimated that only India, Pakistan, South Korea, and Taiwan Province have a power network sufficient to install a conventional nuclear power station of 1,000 megawatts. Apparently, the per-kilowatt construction costs for a 200-megawatt "miniature reactor" are over 200 percent higher than those for the construction of a 1,000 megawatt nuclear power station, which makes small-scale nuclear power stations even less economically attractive. The capital-intensive nature of nuclear power stations put another burden on developing nations which already have all sorts of debts to pay. In particular, since most of the money for such projects must be spent abroad, foreign exchange resources will be exhausted. Therefore, the majority of developing countries see substituting importation of nuclear energy for oil importation as a way of saving money. Obviously, the prerequisite for the construction of a new nuclear power station is relatively speedy improvement in economic conditions. Even if a nuclear power station is built, judging by the experience of various countries, it is best planned and managed by the central government. A central government will pay serious attention to the standardization of nuclear power station designs, to avoid environmental pollution and take account of the effect of the environment on nuclear power stations (such as earthquakes) otherwise, costs will be even higher.

#### 4. Choosing a Future Nuclear Energy Strategy

The influence of cold economic realities on nuclear energy is something which the tens of thousands of demonstrating masses, burning with righteous indignation, have never gone into; these realities have put a stop to the blind development of the nuclear energy industry, and sobered up the people who "rushed headlong" into building nuclear power stations. By now, the majority of U.S. companies have publicly announced that they will no longer consider including nuclear energy in their power generation plans for the next 10 years. It should be pointed out that the various countries involved have not yet included the damage to the human environment of nuclear pollution in their power cost estimates. Some specialists persist blindly in publicizing the question of nuclear power "safety," hardly realizing that great sacrifices will have to be made for this safety, and moreover that the necessary technological and management levels will be hard to attain.

There are two different estimates as to the future of nuclear energy. One is that the current decline in the nuclear energy industry is temporary, and that sooner or later, with the increase in energy needs and the rise in standards of management and science and technology (for instance breakthroughs in nuclear fusion technology), it will develop further. The other estimate is that now, the issue is not whether or not to make certain small-scale readjustments, but that it is necessary to realize that the nuclear energy industry has become a dying industry, and it is not long before it will decline to nothing. The common feature of these two estimates is that the nuclear energy industry is in a state of decline, and that there exists the problem of the industry being uneconomic. Apparently, even Japan, which has such a serious lack of natural resources, is gathering experts from other countries to discuss this problem.

The "1984 World Situation Report" put out by the U.S. Worldwatch Institute contains an article written by Christopher (Fulaiwen) [1133 5490 2429], entitled "A Re-evaluation of the Economic Viability of Nuclear Energy." The article points out that for developing countries, careful consideration is necessary on the question of whether nuclear power represents a wise use of scarce resources.

Nuclear energy creates very few job opportunities, and makes Third World countries more dependent on foreign governments and companies than any other investment project. Nuclear energy projects not only cause environmental pollution and affect the lives of generations of people, but represent prime targets for military attack. In his opinion, we have a wide margin of choice, and the wisest overall goal must be the maximum energy at minimum cost, taking into account the effect of each sort of energy on the environment and the costs that this will involve in each case. Coal is by no means an attractive choice, since the acid rain produced by coal causes particularly serious losses to health and the environment in developing countries. Hopeful choices lie in renewable power resources such as small hydropower stations, geothermal energy, bio-energy, wind power and photo-electric solar power. Simultaneous generation of heat and electricity is a fast-developing method we could choose. Though the costs for these resources are at present about the same as those for coal and nuclear energy, while the costs for these new types of energy are gradually dropping, those for coal and nuclear energy are continuing to rise (see table 2).

Table 2. Estimated Generating Costs for Power Stations Built in 1983 and Predictions for 1990 (at 1982 dollar rate, U.S. cents per kilowatt)

Power Source	1983	1990
Nuclear	10-12	14-16
Coal	5-7	8-10
Small Hydropower	8-10	10-12
Production-related Electric	4-6	4-6
Bio-energy	8-15	7-10
Wind Power	15-20	6-10
Solar Power	50-100	10-70
Energy Efficiency	1-2	—

(Source: 1133 5490 2429)

Moreover, new energy resources can be built on any scale. As for investment in rural electrification, the use of small-scale renewable resources or high-temperature wood-burning stoves would be much more effective. In addition, the active formulation of energy efficiency plans and the carrying out of effective investment will save large amounts of power and costs. In fact, the United States and other countries are now investing in renewable energy resources such as windpower, solar power, and so on. Chester Brown has pointed out that "the United States, which led the world into the age of nuclear power, may very well be the country to lead the world out of it." The Soviet Union and East European countries are now actively making use of methane gas, hydropower, solar power, wind power and geothermal power. Soviet energy experts estimate that by 2100, solar power will satisfy one-fifth of the world's energy needs. The Soviet Union plans to build a series of solar power stations with a capacity of 3,000 to 5,000 kilowatts between 1981 and 1985; it also plans by 1985 to build a wind power generating complex with an installed capacity of up to 5,000 kilowatts; and it is estimated that by 1990, 15,000 wind-powered generators will be built in the countryside. Romania has decided that by the year 2000 it will build several thousand more wind-powered generators with capacities ranging from several thousand watts to 1,000 kilowatts. The Soviet Union is presently preparing to build a large-scale geothermal power station with an installed capacity of 200,000 kilowatts. Hungary has put research and use of geothermal resources before coal, oil, and natural gas, and is carrying out widespread use of it.

China is also facing a decisive choice in terms of energy strategy: Primarily, this involves the choice between whether or not to make nuclear energy a long term energy development strategy. In my opinion, from the point of view of economics and safety, the best that can be said is that nuclear energy does not at present possess the conditions. As for what the future holds, we have to wait for more research and experimentation. We should make renewable energy resources the emphasis of our long-term energy development plans, and speed up investment in this area in terms of personnel, finances, and materials. To this end, I propose the following: The speedy establishment of a renewable energy industry bureau, the drawing up of concrete plans, research into and use of all the various types of renewable energy, and the industrialization of this new science and technology as fast as possible. As long as we work really hard, even without nuclear energy we will not suffer a situation in which "there is a temporary shortage of energy resources." The second choice involves the question of whether it is possible to build a batch of nuclear power stations in the short term. In my opinion, with the exception of the projects which have already gone into construction, we should not start any more projects. We can use part of the foreign exchange set aside for the importation of reactors in the original plan to introduce technology, with the emphasis on solving weak links in the non-nuclear energy field and in transportation and communications, along with the development of new technology in the field of communications, and so on. The problem in most urgent need of solution in China is the irrational arrangement of the forces of production and energy resources. Henceforth, we must on the one hand continue to establish high-energy-consumption projects in areas where there is no lack of energy resources, and on the other hand plan a strategic shift, and continue to grasp the work of transportation and energy-conservation, and on the basis of overall balance, effect the stable development of the national economy.

Editorial 1/14

PEOPLE'S REPUBLIC OF CHINA

GUANGDONG NUCLEAR PLANT TO SIGN AGREEMENT WITH UK

HK071144 Hong Kong Television Broadcast Limited in English 1100 GMT 7 Dec 84

[Text] The Guangdong nuclear power station joint venture agreement will be ready for signing in about a month from now. That news tonight from Britain's visiting minister of state for energy. Shirley Lam has more:

[Begin recording] Alick Buchanan-Smith earlier met Chinese Vice Premier Li Peng and other senior Chinese officials during his week-long stay in the Chinese capital. The British minister of state told a news conference in Hong Kong that Chinese officials expect the Guangdong nuclear power station joint venture agreement to be completed in a month.

Buchanan-Smith said that the resolving of the Hong Kong question will further boost economic ties between China and Britain. He says the UK Department of Energy has established a China unit in its offshore supplies office specifically to advise the Chinese Government on Britain's offshore industrial capabilities. Buchanan-Smith also revealed that British companies are about to undertake feasibility studies on major mine developments at Tangshan and at Jinan, and that that UK hopes to play a major role in China's energy plan. [end recording]

CSO: 5100/4124

PEOPLE'S REPUBLIC OF CHINA

LI PENG, FRG GROUP DISCUSS NUCLEAR POWER TIES

OW111304 Beijing XINHUA in English 1256 GMT 11 Dec 84

[ "Vice-Premier Discusses Nuclear Power Cooperation With Federal Germany"--XINHUA headline]

[Text] Beijing, December 11 (XINHUA) -- Vice-Premier Li Peng today exchanged views with a group from the Federal Republic of Germany on cooperation in nuclear power development between the two countries.

The group, a comprehensive mission on nuclear power, is led by Dr. Hans Frewer, executive vice-president of the Nuclear Power Works Union (KWW).

After the meeting, Li Peng hosted a dinner for the guests who arrived here yesterday and had their first round of talks with leading officials from several Chinese Government departments today.

CSO: 5100/4125

PEOPLE'S REPUBLIC OF CHINA

**SONG RENQIONG AT NUCLEAR DATA CENTER OPENING**

**OW200014 Beijing XINHUA Domestic Service in Chinese 0818 GMT 19 Dec 84**

**[By reporter Zhang Jimin]**

**[Text] Beijing, 19 Dec (XINHUA) -- A foundation stone laying ceremony for the China Nuclear Information Center was held in Beijing today. Amid the sound of firecrackers, Song Renqiong, member of the Political Bureau of the CPC Central Committee, banked up earth with a spade.**

The China Nuclear Information Center now under construction is located at Mashenmiao on Xisanhuan Road, covering a total floor space of 24,000 square meters. The main and side buildings comprise six main departments and rooms, namely, the department for reading books and reference materials, the data bank and computer department, the audio and video duplication and exhibition room, the department for information research and guidance in information service at grassroots level, and the department for editing and publishing books and periodicals on nuclear science and technology. Upon completion, the building will become a center for storing literature on nuclear science and technology, retrieving nuclear information for research, and publishing books and periodicals on nuclear science and technology. The center will provide information on nuclear science and technology on a national basis as well as offer on-line search for information on computers at home and abroad. The whole project is expected to be completed by the end of 1986.

**CSO: 5100/4128**

PEOPLE'S REPUBLIC OF CHINA

BRIEFS

FRG DISCUSSING NUCLEAR CONTRACTS—West Germany is working hard to gain a slice of China's substantial atomic market. This week, German businessmen are discussing in Beijing a potential \$2 billion contract to build a nuclear energy plant in Jiangsu Province. That project would be for a pair of 1,000 megawatt reactors, with an option for two more. France and Britain are now in the final stages of securing contracts with China to build a \$3.5 billion power plant at Daya Bay, north of Hong Kong. [Text] [Hong Kong Television Broadcast Limited in English 1100 GMT 12 Dec 84]

CSO: 5100/4126

## REMOVAL OF LAST OF NUCLEAR WEAPONS REPORTED

Toronto THE GLOBE AND MAIL in English 15 Nov 84 p 4

[Text]

MONTREAL (CP) — The last nuclear weapons on Canadian soil were removed without fanfare in July, the Department of National Defence confirmed yesterday.

"These weapons were no longer required," said Lieutenant Jill Robinson, a department spokesman. The return to the United States of an estimated 55 nuclear-tipped Genie missiles was not publicly announced.

Lieut. Robinson said the department simply followed up on a commitment made by then prime minister Pierre Trudeau to strip the Canadian Forces of any nuclear role.

A spokesman for the External Affairs Department said there were "no great foreign policy implications" resulting from the removal because Canada still remains a member of the North Atlantic Treaty Organization and the North American Air Defence alliance.

"We haven't completely dissociated ourselves," Louise de Lafayette said. "We just don't have (nuclear weapons) and we won't use them."

Mr. Trudeau told the House of Commons in March that with the introduction of the new CF-18 fighters the Genie missiles would be sent back to the United States. The air-to-air missiles were situated at Canadian Forces bases in Bagotville, Que., Comox, B.C., and Chatham, N.B.

They were under U.S. control and, in the event of an attack on Canada by manned bombers, they were to be fitted to Canada's CF-101 Voodoo interceptors. The aging Voodoos are being replaced by CF-18s.

The Trudeau government made a commitment to equip the CF-18 with conventional weapons when it was chosen in 1981 as the main combat aircraft of the Canadian Forces.

Mr. Trudeau, in his speech accepting the Albert Einstein International Peace Prize in Washington on Tuesday, criticized the "macho posturing" by NATO and called on the Western alliance to make a commitment not to be the first to use nuclear weapons.

In a telephone interview from Chicago, Bill Swartz of the Einstein Institute said Mr. Trudeau's proposal for a summit of the five major nuclear powers and his commitment to disarmament were the reasons he was given the award.

"Not only did he say such things were necessary, he actually did them," Mr. Swartz said.

In 1963, as a law professor at the University of Montreal and a supporter of the New Democratic Party, Mr. Trudeau was sharply critical of the policy reversal by Lester Pearson in agreeing to allow nuclear warheads for Canada's Bomarc anti-aircraft missiles.

When he succeeded Mr. Pearson as Liberal leader and prime minister, Mr. Trudeau oversaw the phasing out of the Bomarc in 1971 and gradually changed Canada's NATO role.

Honest John short-range nuclear missiles were taken away from Canada's ground forces in Europe and CF-104 Starfighters based at Lahr, West Germany, were given a low-level ground-support and reconnaissance role, using conventional weapons.

While there are no nuclear weapons stationed in Canada now, U.S. bombers armed with nuclear weapons regularly fly in Canadian airspace and the U.S. Air Force tests cruise missiles in Western Canada.

Rick Katon of Operation Dismantle in Ottawa said that despite the removal of the Genie missiles Canada remains an active participant in the arms race, allowing nuclear submarines to dock in its ports and the testing of submarine weapons in its waters.

"Canadians have this self-perception as being a sane middle power," Mr. Katon said. "If we want to be a sane middle power we have a ways to go."

CSO: 5120/8

PLANS READIED FOR OVERHAUL OF TWO ONTARIO HYDRO REACTORS

Pressure Tube Removal

Toronto THE TORONTO STAR in English 16 Nov 84 p A3

[Article by Bill Walker]

[Text] Nine months and \$50 million after two Pickering nuclear reactors were shut down to be overhauled, the risky job is finally about to begin.

Yesterday, Ontario Hydro officials conducted a tour of a mock-up reactor (formerly a warehouse) specially constructed at Pickering to train workers to avoid deadly levels of radiation.

Next week, the first humans will venture inside a reactor at Pickering and begin a job that has never been attempted. Highly radioactive pressure tubes must be removed and safely stored outside the reactor core.

"This is basically a very simple task in terms of engineering, but what complicates the task is the presence of radiation," said Hydro design co-ordinator Brian Murdoch.

Hotter yearly

The 14-year-old pressure tubes have been getting "hotter" each year that uranium fuel has passed through them. Today, a human touching a tube would receive about 5,000 rems of radioactivity--when only 500 rems would kill most people.

"These are the elements that make the job a little more difficult," said Murdoch.

The project--called retubing--was forced on Hydro by an accident at Pickering in August 1983, when a pressure tube ruptured. It was the first accident of its kind in Candu nuclear history.

The threat of more pressure tube ruptures caused Hydro to shut down two reactors and launch the \$1 billion project last March.

"We are learning by experience," said Hydro operations manager Ken Talbot. "We have to make sure everything will work the first time and correctly."

All tools for the project are being meticulously tested and retested. Workers inside the mock-up—and exact replica of a reactor minus the radioactive core—are walking the same steps they'll walk when the job begins.

Workers will wear rubber "space suits," will be shielded in a thick steel enclosure the size of a railway boxcar and will be limited in the amount of time they can work under radiation exposure.

Hydro estimates that most workers will stay on the job 10 to 40 days before they reach their three-month radiation exposure limit. The entire project is expected to take three years and 500 workers are being trained to take part.

Hydro officials say radiation levels will be monitored at all times and if a worker suddenly reaches his or her limit due to a radiation leak, the worker will be immediately pulled off the project.

Direct human exposure to any of the pressure tubes will be avoided through the use of remote controlled tubes.

#### Remote control

A remote control tool Hydro had hoped to receive from SPAR Aerospace won't be fully developed on time to be used at Pickering, Murdoch said. Without the tool, the job will simply take longer, he added.

There are 390 pressure tubes in each of the two reactors. Once removed, they will be stored temporarily in large containers on the Pickering site, while Hydro attempts to find a permanent storage site.

The first reactor at Pickering should restart in November 1986 and the second in February 1987.

#### Shutdown of Newest Reactor

Toronto THE GLOBE AND MAIL in English 14 Nov 84 p 22

[Article by Thomas Claridge]

[Text] The newest operating reactor at the Pickering, Ont., nuclear power development has been shut down so two large, leaky heat exchangers can be removed and replaced by 13-year-old units borrowed from two reactors whose pressure tubes are being replaced.

Although the precise cause of the problem isn't known, Ontario Hydro has begun seeking tenders to replace all 16 shutdown coolers in the four-reactor Pickering B generating station, including eight in units not yet in service.

The \$300,000 heat exchangers, each containing about 1,000 U-shaped tubes, use ordinary lake water to cool heavy water from the reactor's main heat transport system.

Hydro spokesman Jack Muir said the problem with the Unit 6 reactor system was first observed last December while the unit was being tested before going into commercial service. He described the leak rate of the radioactive heavy water as "about a cup a day," or less than 1 percent of allowable releases.

The leaks came as a rude shock because 16 similar units in the Pickering A station have worked flawlessly since the plant's first reactors started producing power in 1971.

Mr Muir said one of the four coolers in Unit 6 was leaking so badly that a replacement was installed last spring from one of the two reactors still under construction.

Although the heat exchangers have a safety function--as emergency coolers during a serious reactor accident--the station's operating licence allows normal reactor operations with only two of the four units in service.

Mr Muir said that in recent months, Unit 6 had been running with the replacement and one other heat exchanger.

But a steady increase in the leak rate led to a decision to take the reactor out of service Nov 2 for about three weeks.

#### Computerized Nuclear Simulator

Toronto THE GLOBE AND MAIL in English 14 Nov 84 p B3

[Article by Thomas Claridge]

[Text] A \$3.3-million investment by Ontario Hydro in a computerized training simulator for nuclear operators is starting to produce big dividends for the utility.

Successful operation of the simulator at the Pickering A generating station near Toronto led three years ago to an agreement under which nuclear-plant technology was transferred to the simulator's manufacturer, CAE Electronics Ltd, a unit of CAE Industries Ltd of Toronto, in exchange for future royalties on simulator sales to other utilities.

Spokesmen for the parties said yesterday the deal has led to payment of nearly \$1-million in royalties on sales of three simulators to U.S. power companies worth a total of \$30-million. A sale last year to Boston Edison Co of Boston was followed in August by a deal involving two simulators for Florida Power and Light Co of Miami.

The first simulator won international recognition last year when its use was cited in an excellent operator response to a potentially serious incident at Pickering--the rupturing of a reactor pressure tube.

At the time, operators said the actual experience in the control room closely resembled one of the accidents programmed into the simulator.

Ordered in the spring of 1974, the first Ontario Hydro simulator was placed in service during November 1976. Since then, the utility has committed nearly \$53-million for four more sophisticated simulators at three sites, two of which are in operation.

The \$11.3-million simulator for the Bruce A generating station near Kincardine, Ont., has been operating since April 1983, and a \$12.8-million unit for the Pickering B plant was officially turned over to Ontario Hydro yesterday.

Fred Fraser, CAE's vice-president of corporate relations, said several representatives of at least one large U.S. utility were present for the ceremony.

William Morison, Ontario Hydro vice-president of design and construction, said the CAE-Hydro partnership has resulted in the utility having the best nuclear training and control system anywhere.

"Our know-how in design and operation of both nuclear and fossil generation plants is recognized by electric utilities world-wide," Mr Morison said. "And thanks in part to the excellent training our simulators provide, our safety record is the envy of most utilities."

Under terms of the agreement, CAE acts as prime contractor responsible for design, manufacture and marketing of the simulators. Ontario Hydro acts as a subcontractor, providing knowledge of generating station design and operation and helping to evaluate customer needs.

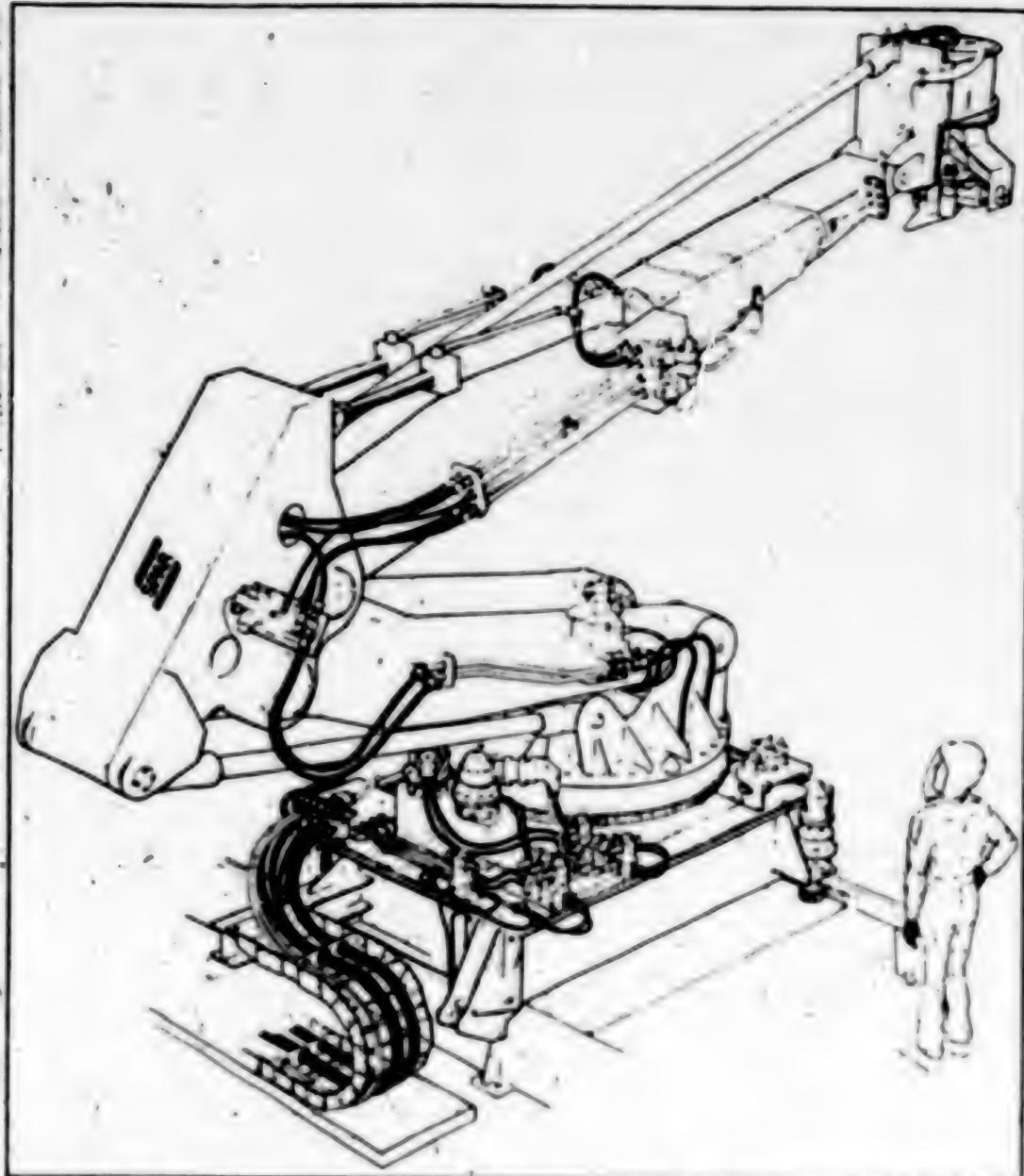
Byron Cavadias, CAE president, termed the Florida sale "one of the most significant in our company's history." He estimated that another 15 U.S. utilities have 20 nuclear plants that will require similar installations.

#### Bionic Arm Agreement

Toronto THE TORONTO STAR in English 19 Nov 84 p B13

[Article by Jack Miller]

[Text] Ontario Hydro and Spar Aerospace have finally agreed on what it will cost to build an earth-bound version of Spar's famous space shuttle bionic arm for use in Hydro's nuclear reactors.



**Atomic arm:** Artist's concept shows earth-bound version of Spar's space arm, to be built for Ontario Hydro at a cost of \$33.8 million. Hydro will use the arm to replace fuel channel tubes in its nuclear reactors. Broken tubes caused the shutdown of two Pickering reactors.

The contract is for \$33.8 million and delivery target is 1986.

It took them a long time to make up their minds. The start of the development was reported here 22 months ago, even though the parties weren't talking about it then.

Hydro wanted a down-to-earth arm to haul fuel channel tubes out of its nuclear reactors and put new ones in their place. This is because the metal tubes stretch while reactors are running and would eventually get too long for their end fittings.

Since this would involve handling parts of the reactor core, there would be a lot of radioactivity. Human workers would have to wear cumbersome protective suits and rotate short shifts. A robot arm would be faster and safer.

But it was all very casual at first--the original tubes were expected to be good for maybe 20 years.

Eight months later, when a fuel tube broke at Pickering, Hydro suddenly wanted equipment like the arm available as soon as possible. It was found that some tubes in the two oldest Pickering reactors had stretched and grown brittle.

Hydro decided to play safe and shut down the two old reactors to replace all the tubes. But this is a long, tedious job and the robot arm--if Spar can get it ready in time--would make tube replacement a lot faster. Hydro could get those reactors going again, sooner, which would allow it to shut down some coal generators and stop pumping so much smoke into the air.

This new Spar model won't look at all like its spidery predecessor. The space arm works in zero gravity and handles very little weight. The atomic arm will have muscles and a big three-fingered gripping hand. It will need finesse, too--working to 1/25,000-inch tolerances without wobbling, to avoid snapping any tubes it finds that are especially brittle.

What's next for Spar? Well, it might sell this new arm to reactor owners in other countries because they'll all have tubes to replace sooner or later. And it might try an underwater model, to let ocean drilling platform users make sure rust and other problems are not leaving them without a leg to stand on.

CSO: 5120/7

URANIUM FINDS NOTED IN SASKATCHEWAN, NORTHWEST TERRITORIES

Saskatchewan Report

Toronto THE GLOBE AND MAIL in English 24 Oct 84 p B3

[Text]

REGINA — The Saskatchewan Mining Development Corp. has confirmed Japanese reports that a joint venture, in which it holds a 50.75 per cent interest, has discovered a potentially rich uranium ore body in northern Saskatchewan.

Donald Somers, vice-president of corporate affairs for SMDC, said the provincially owned company estimates reserves at the Cigar Lake site 115,000 tonnes of ore grading about 10 per cent uranium. In comparison, Mr. Somers said the nearby Key Lake uranium mine, owned 50 per cent by SMDC, is the world's largest uranium producer but has smaller estimated reserves and a grade of about 2.5 per cent.

SMDC is involved in a venture with Idemitsu Kosan Co., a Japanese oil company, and Cogema, a French state-owned nuclear

fuel company. The French company holds 37.375 per cent while the Japanese company has 11.875 per cent, SMDC said.

The SMDC official was responding to reports from Tokyo, quoting an official of Idemitsu Kosan as saying the discovery is expected to hold the world's richest uranium ore reserves.

Mr. Somers said tentative production plans call for development of the site "sometime in the early to mid-1990s. We're progressing, but there's still a lot of work to be done." He said costs will be spent according to ownership levels but declined to disclose the amount of spending to date.

He added that development of the site will be dependent on market conditions, with higher uranium prices pushing the startup date ahead and weaker prices delaying development.

## Northwest Territories Find

Toronto THE GLOBE AND MAIL in English 8 Nov 84 p B6

[Article by Lawrence Welsh]

[Text]

**Urangesellschaft**  
Canada Ltd. of Toronto says it has discovered two new zones of mineralization at its uranium property in the Baker Lake area of the Northwest Territories.

The deposits are similar in character to the adjacent Lone Gull property at Sissons Lake, whose Main and Centre zones have combined reserves at an estimated 35 million pounds at a grade of 0.39 per cent uranium oxide.

With both zones open and requiring additional study, Urangesellschaft said it plans further drilling there in the 1985 field season, as well as drilling additional targets.

While uranium markets remain depressed, and with uranium sales mainly by U.S. utilities depressing the spot price to about \$16 to \$17 (U.S.)

a pound, the company, wholly owned by Urangesellschaft GmbH of West Germany, expects a turnaround in demand by the end of the decade.

"We should see the price and market situation looking better by 1989-90," said Michael Stuart, executive vice-president of Urangesellschaft Canada. Although a five-year lead time is needed to bring a mine on stream, "we hope there is sufficient recovery to be able to take a decision to put the property into production by that time."

Urangesellschaft is proceeding with more advanced exploration at the Baker Lake property so it is ready to move into the feasibility study and production decision stages once there are firm signs that markets are improving and prices rising. Current long-

term sales contracts indicate a price of about \$30 a pound is required.

At one new zone, on the Lone Gull property about five kilometres from the Main and Centre zones, 1,391 metres of drilling were completed in eight holes, six of which showed "significant" mineralization, Mr. Stuart said. The best section averaged 0.75 per cent uranium oxide over a borehole width of 5.8 metres at a depth of 100 metres.

At the second new zone, four kilometres from the Lone Gull deposit on the Sissons-Schultz South property, six holes totalling 1,067 metres were completed, of which two found intermittent mineralization over 40 metres. The best section averaged 0.60 per cent oxide over a borehole width of 6.1 metres at a depth of about 140 metres.

CSO: 5120/8

## POTENTIAL MISUSE OF TRITIUM CHARGED IN DOCUMENTARY

Toronto THE TORONTO STAR in English 29 Oct 84 p A5

[Article by Pat McNenly]

[Text]

About \$750 million worth of radioactive tritium that Ontario Hydro hopes to sell for peaceful uses could end up in United States nuclear warheads, a CBC documentary charges.

Nick Fillmore, producer of CBC Radio's Sunday Morning show, *The Trafficking In Tritium*, broadcast yesterday, said there are no guarantees that Canada's tritium won't end up in bombs.

Tritium, a heavy form of hydrogen and one of the most valuable substances in the world at \$15 million a kilogram (\$6.8 million a pound), is a waste product from Hydro's Candu nuclear reactors.

After some of the radioactive material escaped into Lake Ontario, Hydro began constructing a \$100 million plant to collect tritium as a safety measure, then realized its potential as the fuel of the future. Scientists feel it is the best source of fuel for fusion reactors still in the design stage.

Fillmore said Hydro's projected customers for tritium include four giant weapons laboratories in the United States.

#### No sales yet

Tritium now is used mainly to make hydrogen bombs and for self-illuminating exit signs in aircraft and some buildings.

Tom Drolet of Ontario Hydro, who is also program manager of the Canadian Fusion Fuel Technology Project, said yesterday that Hydro has letters of intent from major researchers and laboratories both in Europe and the United States indicating interest in buying Hydro's tritium when it becomes available in two years, but no sales have been made.

The CBC said that the agreements that Canada is on the verge of signing with four major laboratories in the U.S. are not as "innocent" as made out because these laboratories engage in both peaceful and military fusion research.

In these laboratories — regulated by the U.S. Department of Energy, which spends more than half its budget on nuclear weapons — peaceful and military research is carried on side-by-side, the CBC said.

At one of them, Lawrence Livermore Laboratories in California, scientists are working on designs of all types of nuclear weapons from large-megaton warheads to the cruise missile.

#### Need more tritium

But Drolet said he was not upset that some of the U.S. laboratories are engaged in both peaceful and military research. He said none of the tritium could end up in weap-

ons, as suggested by the program, because the Canadian government would never allow it. There will be specific controls over where the tritium goes and how it is used.

The program said the U.S. defense department told Congress there is a shortage of tritium for bombs and the energy department has been ordered to double its stockpile by 1990. If the shortage became acute, the government would seize all available supplies "and Canadian tritium sold in the U.S. could end up in nuclear weapons," the program said.

The program said the U.S. reversed its stand on a promise to Britain that plutonium it bought would never be used for military purposes.

Nuclear exports are controlled by the Department of External Affairs and the Atomic Energy Control Board.

While Canadian export safeguards provide that all nuclear materials that could be used for military purposes must be approved by the government, "because tritium exports are only just beginning, Canada has no specific regulations controlling its sale to other countries," the program said.

Dave Sindon, who heads the National Research Council's nuclear safeguards division, said on the program the board hopes to have recommendations on tritium con-

trols ready for the government early in the new year.

A total of \$21 million is being spent over five years under a joint Canadian-Hydro-university project on research into the sale and the promotion of tritium and tritium technology administered by the Canadian Fusion Fuels Technology Project.

The proposal to export tritium and tritium technology "is another example of how Canada blurs the line between the peaceful and military atom," said the program, noting that "Canada's peaceful technology helped India get the atomic bomb."

The program quoted a critic of the U.S. military saying that the U.S. could need tritium for as many as 40,000 warheads over the next 15 years because the nuclear material in them is "decaying" and the warheads have to be replaced.

Terry Brown of the National Research Council, who heads the national program of fusion research and development, described the CBC program as the work of "a wild imagination" that sees a conspiracy where none exists.

He said the Canadian project is involved only in the unclassified or non-secret area of nuclear research and everything is open to inspection.

CSO: 5120/8

ARGENTINA

ALFONSIN TO ATTEND SUMMIT ON NUCLEAR DISARMAMENT

PY041353 Buenos Aires NOTICIAS ARGENTINAS in Spanish 2310 GMT 3 Dec 84

[Text] Buenos Aires, 3 Dec (NA)--President Raul Alfonsin and five other heads of state will hold a meeting on nuclear disarmament during the visit which the Argentine president will pay to India in January. This information was disclosed by Indian Ambassador to Argentina Lakan Lal Mehrotra after a meeting held with Alfonsin, to whom he delivered a personal message from Prime Minister Rajiv Gandhi.

The ambassador stated that he had extended an official invitation to President Alfonsin, which was accepted, to meet in New Delhi with the Mexican, Swedish, Greek, India and Tanzanian heads of state. As is known, Argentina and the aforementioned countries have signed a declaration demanding concrete actions to achieve nuclear disarmament and warning of the threat which the proliferation of such arms represents to mankind.

Referring to the visit that Alfonsin will make to India on 22 January, Mehrotra said that it will "be the visit of a head of state of a democratic country to the greatest democracy in the world. Therefore, we are eagerly awaiting such a significant visit." The Indian ambassador said that Alfonsin "not only will be a guest of the Indian Government but also of the entire nation, and as such he will take part in the ceremonies on 26 January when we celebrate the Day of the Republic." The diplomat noted that Alfonsin's visit to India "will serve to increase the paths for international cooperation between the countries and also to improve bilateral relations in all fields."

Regarding the support which President Alfonsin will allegedly grant Prime Minister Gandhi for another 4-year term at the head of the Nonaligned Movement, the Indian ambassador asserted that "I believe we have the president's full support to continue holding the presidency of the Nonaligned Movement for a new term."

CSO: 5100/2043

ARGENTINA

BRIEFS

CNEA RESUMES URANIUM EXCAVATION--Buenos Aires, 13 Dec (DYN)--Today the National Atomic Energy Commission [CNEA] announced the resumption of excavations of the uranium deposits in Sierra Pintada, Mendoza Province. It also disclosed that once the raw material is processed it will supply the Atucha I and Embalse nuclear plants in Cordoba for 3 years. The mineral exploitation being carried out on the banks of the El Tigre River, 30 km from San Rafael, is part of a program to produce 560,000 tons of uranium. The uranium will be processed in the plants that the CNEA has in San Rafael and Malargue to produce uranium concentrates. The Sierra Pintado deposits' production, in addition to the uranium extracted from the Cordoba Los Gigantes deposits, will cover the fuel needed by the nuclear plants in Atucha and Embalse. [Text] [Buenos Aires DYN in Spanish 2311 GMT 13 Dec 84]

VALVES FOR NUCLEAR CENTER--Rome, (TELAM-EFE)--The TTG department of the Italian multinational company Fiat has provided 20 special valves; whose cost was estimated at more than \$2 million, to the Argentine Atucha II nuclear center that is being built by the FRG corporation KWU. According to a communique released by the company, the valves, designed and built under a Fiat TTG patent, are obstruction-free. [Text] [Buenos Aires TELAM in Spanish 2007 GMT 29 Nov 84]

CSO: 5100/2043

## TITANIUM PRODUCTION FROM ANATASE NATIONAL RESERVES

Sao Paulo GAZETA MERCANTIL in Portuguese 20-22 Oct 84 p 11

[Report by Sergio Danilo]

[Text] Rio--This year, Brazil should increase its domestic production of pigment of titanium dioxide (intermediate between the mineral and metallic titanium) by 4,000 tons, from 46,000 tons last year to 50,000 tons, according to information given to this newspaper by Paulo Roberto de Paula of the Mineral Economy Department of the Mineral Research and Resources Company (CPRM), the author of a study on the profile of the titanium industry. The Brazilian share of world reserves of ilmenite and rutile is insignificant. Ninety-eight percent of the rutile reserves and 94 percent of the ilmenite reserves, minerals that produce metallic titanium, are located in the municipality of Marataca (Paraiba).

However, Paulo Roberto de Paula explained that Brazil has a new alternative for the production of titanium using an exclusively national mineral--anatase, the already measured reserves of which total 530 million tons, more than 80 percent of which are located in Minas Gerais (Tapira and Araxa) and 11 percent in Goias (Catalao). Utilization of the anatase for the production of titanium is already being carried out in the pilot-plant of the Vale do Rio Doce Company in Tapira. The world reserves of rutile are concentrated in Australia, South Africa, Italy and Sri Lanka, while those of ilmenite are in Norway, Canada, South Africa, China and the United States.

The Brazilian production of concentrates of rutile is obtained entirely by the NUCLEOAS Monazite and Associated Minerals (NUCLEOM) through the beneficiation of the monazitic sands of the Rio de Janeiro coast and Espirito Santo. According to the CPRM expert, NUCLEOM manages to extract a titanium content of up to 96 percent from the monazitic sands. On the other hand, the production of pigments based on titanium dioxide is done by Titanio do Brasil S.A. (TIBRA). In the opinion of Paulo Roberto de Paula, the growth of domestic production "has been strongly encouraged by the general difficulties imposed by the government on imports aimed at maintaining a large surplus in its trade balance." The titanium-based alloys have evolved from a production of 430 tons in 1982 to 378 tons in 1983, and the estimates of the producers for this year indicate a production of 600 tons.

## Imports

The imports of concentrate of rutile, almost exclusively from Australia, constituted the main source of supply of the domestic market. The variations noted are due to the operation of large companies that manufacture electrodes for electric welding, "which import reasonable quantities to resell to other manufacturers in the sector and to form stabilizing stocks," said the CPRM expert. Last year, Brazil imported 1,972 tons of concentrates of rutile in the amount of \$948,000; 21,000 tons of concentrates of ilmenite in the amount of \$1.8 million; 26,218 tons of titanium-bearing slag in the amount of \$5.2 million; and 10,300 tons of titanium dioxide in the amount of \$13.8 million. According to CPRM figures, the imports of concentrate of ilmenite from Australia have been decreasing appreciably. "TIBPAS has been importing increasing quantities of titanium-bearing slag from the Republic of South Africa," the CPRM expert declared.

## Domestic Consumption

"The domestic consumption of rutile, basically used by the electric welding electrode factories, is supplied almost entirely by imports," said Roberto de Paula. In 1983, the consumption of rutile was in the order of 2,435 tons; of concentrates of ilmenite, 51,473 tons; of titanium-bearing slag, 26,218 tons; of pigments of titanium dioxides, 56,230 tons; and of titanium-based alloys, 545 tons.

## Projects

The RIB, a company controlled by the THEMAS group is carrying out a project for the expansion of its mining operation and the reserves in the region of Mataraca in Paraiba, which will make it possible to produce 102,000 tons of ilmenite in 1983, and for the installation of special equipment for the production of 15,000 tons of ilmenite. Another important project is the one pertaining to the production of 15,000 tons per year of concentrate of titanium based on the mineral cassiterite, a project that went into production in August of last year.

This concentrate is being tested by the consumers, the results having led the Vale do Rio Doce Company (CVRD) to study the construction in 1986 of a new industrial unit with a capacity of 50,000 tons per year of concentrate. For the utilization of that concentrate, there are three groups interested in building an industrial plant for the production of 50,000 to 60,000 tons of pigments: they are the Andrade Gutierrez (national), Tioxide (British) and Dupont (US). The CPRM expert said: "The Aeronautical Technological Center (CTA), METAMIG and the CVRD are engaged in efforts aimed at building the first industrial unit in Brazil for the production of metallic titanium with technology developed by the CTA."

BRAZIL

GOMES ON YELLOW-CAKE EXPORTS TO TURKEY, CURRENT STOCKS

Sao Paulo GAZETA MERCANTIL in Portuguese 6 Nov 84 p 13

[Article by Sergio Garschagen]

[Text] Brasilia--About 6 months ago, NUCLEBRAS [Brazilian Nuclear Corporations, Inc.] received a proposal from Turkey involving the supplying of 150 tons of yellow cake (uranium concentrate) annually for 5 years. Due to a lack of working capital, the firm is unable to negotiate with the Turks, who are currently taking their first steps in the field of nuclear technology for peaceful purposes.

This was announced by Dario Gomes, chairman of NUCLEBRAS, following a discussion yesterday morning with Minister Cesar Cals. To give a practical example, he recalled that in the budget for 1984, which was submitted to the Secretariat of Planning (SEPLAN) at the end of 1983, NUCLEBRAS requested 36 billion cruzeiros for investments. So far it has received only 20 billion. For 1985, NUCLEBRAS has requested 60 billion cruzeiros.

Dario Gomes feels that despite the problem of a lack of funds, the first stage of the uranium enrichment plant in Resende, Rio de Janeiro should begin operating in February 1985. If it is possible to export yellow cake to Turkey--at \$30 per pound (453 grams)--NUCLEBRAS will be in a better position to invest, chiefly in the production of enriched uranium, a product whose exportation is much more profitable financially.

Dario Gomes also recalled that because of the lack of funds, the plant in Pocos de Caldas, Minas Gerais, where yellow cake is currently being produced, is working at only one-third of its capacity, which is 500,000 tons.

He feels that exports should not affect the national nuclear program. "We currently have a stockpile of 180 tons of enriched uranium, and that is enough for two reloadings at Angra 1 and for operating Angra 2."

A U.S. firm located in California has also expressed an interest in acquiring Brazilian yellow cake through 1989. That is out of the question. According to Dario Gomes, Brazil may be able to supply the Americans with 370 tons of yellow cake beginning in 1990, when uranium will be produced at Tataia in Ceara.

11798

CSO: 5100/2038

GOMES COMMENTS ON NUCLEBRAS INCORPORATION OF NUCON

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 10 Nov 84 p 26

[Text] Rio de Janeiro--Dario Gomes, chairman of NUCLEBRAS [Brazilian Nuclear Corporations, Inc.], says that his firm's authorization--granted by a presidential decree signed the day before yesterday--to absorb its subsidiary NUCON [NUCLEBRAS Nuclear Plant Construction, Inc.] will not affect the continuity of the program for nuclear powerplant construction or lead to cutbacks in personnel. He also says that NUCLEBRAS had been making studies in connection with the absorption for about a year and that it suggested the move to the minister of mines and energy. In turn, the minister referred the matter to the Office of the President of the Republic for a decision.

NUCON is a fully-owned subsidiary of NUCLEBRAS. The decree authorizes NUCLEBRAS to assume all of NUCON's rights and obligations. Dario Gomes announced that the absorption will provide substantial relief from the tax burden weighing on the NUCLEBRAS Group and stimulate the group's activities, resulting in greater administrative efficiency.

He also said that under the terms of the original decree establishing NUCON, the latter administers only 4.5 percent of the NUCLEBRAS budget for the construction of nuclear powerplants and is responsible for only 7 percent of the group's personnel. NUCLEN (NUCLEBRAS Engineering, Inc.) is responsible for everything related to engineering and the technical management of construction, NUCLEP [NUCLEBRAS Heavy Equipment, Inc.] manufactures some of the equipment, and NUCLEBRAS is responsible for all activities related to acquiring domestic and imported equipment and getting it to the worksite. Gomes emphasized that in fact, NUCLEBRAS already exercises direct control over more than 80 percent of the budget for nuclear powerplants.

NUCON's absorption will have a favorable effect on the group's management by permitting direct contractual relations between NUCLEBRAS, FURNAS [Furnas Electric Powerplants, Inc.], and the other subsidiaries and also eliminating the cumulative effect of taxes, said Dario Gomes.

Funds

Dario Gomes said that SEPLAN [Secretariat of Planning] recognized the need to preserve the technical capital and nuclear technology already absorbed and

assimilated by NUCLEBRAS and was influenced by the program for minimum activity as presented to make continuation of the nuclear program possible. Gomes made that statement as he was commenting on the 326-billion-cruzeiro budget increase granted by SEPLAN.

That increase brings the NUCLEBRAS budget for 1984--originally calculated at 1.074 trillion cruzeiros on the basis of an average inflation rate of 75 percent--up to 1.4 trillion cruzeiros. Although this new ceiling on expenditures does not offset the erosion caused by inflation, which had reached a rate of over 160 percent through last October, it will permit the continuation of construction work on the Angra 2 nuclear powerplant and completion of the first phase of work on the NUCLEI [NUCLEBRAS Isotope Enrichment, Inc.] uranium enrichment plant. Completion of the first phase will make operation of the "first cascade" possible in February 1985.

#### More Funds

Also authorized as a result of reformulation of the overall NUCLEBRAS spending plan for 1984 as approved by the Office of the President of the Republic is another operation for obtaining a foreign cash loan totaling \$60 million (which will be the equivalent of 160 billion cruzeiros when it is drawn in December).

The loan contract will be signed in Frankfurt in the next few days by NUCLEBRAS director of finance Wenceslau Magalhaes. It will be signed with a consortium of banks headed by the German Bank Corporation. The loan has a term of 9 years with a 5-year grace period and rounds out phase 2 of the program for restructuring Brazil's foreign debt. The funds will come from plans 1 and 2 of that phase.

11798

CSO: 5100/2627

NEW REACTOR DEVELOPED AT RIO GRANDE DO SUL UNIVERSITY

Sao Paulo GAZETA MERCANTIL in Portuguese 2,3,5 Nov 84 p 10

[Article by Milton Wells]

[Text] Porto Alegre--A new concept for a nuclear reactor will be presented at the Fourth Data Processing Fair in Rio de Janeiro. The concept, which is still under development, is the work of Prof Farhang Sefidvash of the Federal University of Rio Grande do Sul (UFRGS). Unlike conventional reactors, in which the fuel consists of cylindrical uranium rods, this reactor uses small-diameter spheres, explains Sefidvash.

According to its inventor, the chief advantages of the proposed reactor are its simple design and reliability. It can be built with Brazil's existing infrastructure.

A small-scale prototype of the reactor has been built by Eberle of Caxias do Sul (Rio Grande do Sul) and SCM Engineering, Ltd. of Porto Alegre. The two firms, together with Sefidvash, have been conducting research for several months. Eberle supplies the mechanical components, and the SCM supplies programmable logic controllers and speed variators based on microprocessors.

Sefidvash, Iranian by birth but a naturalized Brazilian, fled Iran during the Islamic revolution of 1979. For 5 years he has been developing theoretical studies at the UFRGS while also serving as a professor of postgraduate studies in nuclear engineering. The National Energy Commission and the CNPq (National Council for Scientific and Technological Development) encouraged him to develop his project, which also interested Eberle.

Sefidvash told this newspaper: "We are still at the start of our research. If we achieve our objective, we will have a safe and simple nuclear reactor." According to Sefidvash, the module built by Eberle has inaugurated a new phase of research that he considers promising. "Until we complete the entire design, you will be required for mastering nuclear energy through this new process, our investments are going to be made. And these days, it will not be easy at all to obtain them."

José Luiz Bazzetto, director of SCM, explains that the firm developed a speed variator for induction motors specifically for the environmental needs of the

nuclear reactor. According to him, the new product can be used in various industrial fields, chiefly in the chemical, paper, and rubber industries. Controlled by a microprocessor, this speed variator can operate in conjunction with process control computers, permitting synchronization with industrial plants. Bozzetto said: "Using this reactor, we are developing research so that we can make a presentation at the data processing fair."

11798  
CSO: 5100/2038

BRAZIL

LOW WAGES PROMPT RESIGNATION OF NUCLEBRAS ENGINEERS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Nov 84 p 3

[Article by Roberto Arruda: "NUCLEN is Practically Bankrupt"]

[Excerpts] The nuclear program that has already cost the country \$4 billion is now going through a decisive period: the scarcity of resources may represent the end of its main objective, that of assimilating, mastering and recreating technology. The main company of the NUCLEBRAS [Brazilian Nuclear Corporations, Inc.] group, which is involved in technology, NUCLEBRAS Engineering, (NUCLEN) is practically bankrupt, not even managing to retain its operational engineering personnel trained in Germany at a cost of \$400,000 from the coffers of the nation for each of them.

According to the director-superintendent of NUCLEN, Ronaldo Fabricio, of the 61 engineers of a group of 158 trained in Germany and who had their contracts of mandatory service for 2 years with NUCLEBRAS concluded, 31 have already [line dropped in the original] however, because of a lack of motivation, dismantling of teams and low salaries. Of the remaining 30, NUCLEN had to send 23 to work in KWU [Kraftwerk Union] projects in Germany so as not to lose them.

Wage Policy Causes Engineer Drain

The president of NUCLEBRAS is optimistic as to the possibility of the self-generation of resources for 1985. That would come about if Brazil were to win some international bids it is making together with the KWU in Turkey and Egypt. He says that China is also interested in establishing an industrial nuclear program and is now examining the type of collaboration between Germany and Brazil, inquiring about the transfer of technology and the behavior of the Germans.

In that way, the nuclear agreement between the two countries appears to be opening doors for the KWU and Siemens in countries of the Third World, where NUCLEBRAS may win a part of those markets, particularly in the manufacturing of heavy parts and components in Itajai and later in providing uranium in the form of yellow cake.

In the report on the nuclear program, Dario Gomes showed that the present strategy should be maintained. His argument is that the several teams of project engineering, civil construction, plant installation and commissioning must always be kept busy otherwise they disband. He also believes that a country should master the technology of hydroelectric, coal and nuclear powerplants, with all those plants integrated so as to have a reliable system.

Dario Gomes also admits that NUCLEBRAS has lost some technicians in a seasonal phenomenon and expresses fear of a massive drain of personnel if there is a fast industrial recovery. But his optimism is not shared by the director-superintendent of NUCLEN, Ronaldo Fabricio, who compares the nuclear program with an airplane on takeoff: if a turbine fails it crashes.

Ronaldo Fabricio says that an engineer who works in the nuclear program is a mechanical, civil or electrical engineer and will find easy placement in the labor market because he has sophisticated training in the area of projects and the wage structure of NUCLEBRAS cannot compete with the reality of the market. The presidential decree which restricts salaries in state companies forbids the holding of multiple positions. Therefore, not even by giving classes can those technicians have increased salaries.

How then is it possible to administer an engineering company whose main asset is its body of personnel without being able to exercise a salary policy that is competitive on the market? asks Ronaldo Fabricio. Amazed, the director of NUCLEN explains that "that casuistic decree equates any state company with the Corcovado Railway, for example, in terms of salaries."

Ronaldo Fabricio proposes that there be a special system for state companies such as EMBRAER [Brazilian Aeronautics Company], NUCLEN and AVIBRAS [Aerospace Industry Corporation], which produce advanced technology, in terms of a salary policy.

In the opinion of Ronaldo Fabricio, the present generation of nuclear reactors will be replaced by fast breeders and if Brazil does not follow that change it will go no further in the nuclear area. He warns of the problems FURNAS [Brazilian Powerplants] is facing with the Angra I Powerplant, built without a transfer of technology. According to Fabricio, each malfunction at Angra I forces FURNAS to call in U.S. technicians from Westinghouse and to import parts and components at astronomical prices, in addition to the expensive interruptions in the production of power by the reactor.

#### Letter of Resignation

The following are excerpts from a letter of resignation from one of the most important engineers trained by NUCLEN of Germany, Marcos Peluso:

"It is with reluctance that I come to request my release from the personnel rolls of employees of NUCLEN as of 4 June 1984, because I am aware that I take with me an important part of a technology in which the country invested many resources. I am concerned because the same reasons that forced me to that decision are still present and will certainly lead several colleagues to seek other professional alternatives. The concern would not be so great if a transfer of techniques, and consequently of the know-how of state companies, to national private companies were taking place.

"The main reasons that led me to leave NUCLEN, and which are causing the breaking up of our work team and other state companies active in the area of advanced technology are:

- 1) The lack of professional motivation caused by the uncertain rhythm of the projects under way. Technology is only obtained through practical experience in overcoming difficulties.

It is not possible to maintain the technological patrimony of a team without subjecting it to the real challenge of the succession of problems, which are found during the progress of a project.

If theoretical knowledge of industrial processes or the accumulation of documents on them meant mastery of technology, we would not be a technologically dependent country today. It is worthwhile to say that the major involvement of multinational or transnational groups in practically all industrial segments of our economy demonstrates that in the majority of cases these corporations carry out projects in Brazil which are developed in research and development centers abroad, basically extinguishing our creative capacity for economic reasons.

In that fashion, the harm caused by the lack of continuity in the project on which we work, and in many others in the state area, shows up under the following main aspects:

- A) Dismantling of work teams in state and private companies. The reorganization of those teams would take many years, leaving the country unprepared for the reassumption of development.
- B) Direct, irreparable harm caused by the deterioration of equipment and materials.
- 2) The erosion of wages caused by a wage policy established without considering the problem in all its aspects. While private enterprise quickly revised its official policy so as not to lose its skilled personnel, granting higher wage adjustments than those stipulated by legislation, the leaders of the state companies were forced to follow government guidelines.

The degradation of our salaries forced us to seek alternative employment, including in areas of activity different than ours, with an enormous harm done to the nation, which thus loses its technical resources.

In an economy with a rate of inflation of around 10 percent per month, even the highest readjustments granted recently by the government for high-ranking positions in the state companies completely lose their significance. The situation is even worse if we keep in mind that the restriction on promotions stratifies the companies, not allowing wage improvements for important personnel of the teams."

8908

CSO: 5100/2035

BRAZIL

CONGRESS RECEIVES NUCLEAR AGREEMENT WITH PRC

PY061547 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 5 Dec 84 p 27

[Text] On 4 December, President Joao Figueiredo sent to Congress the text of the cooperation agreement between the Governments of Brazil and the PRC regarding the peaceful uses of nuclear energy that was signed in Beijing on 11 October 1984. The agreement provides for cooperation in the areas of research, construction of nuclear plants and research reactors, manufacture of fuel elements, nuclear safety, and production and application of radio-isotopes.

As said in the explanatory note attached to the text of the agreement and signed by Foreign Minister Ramiro Saraiva Guerreiro, this cooperation will basically consist of the exchange of scientists and technicians, information and documentation, the holding of seminars, and the provision of consultant and technical services. The note further stresses the similarity of the two countries in the matter of energy with their hydroelectric potential partly lying at great distances from the large consumption centers. Due to this situation, the countries need nuclear energy. The cooperation here can be of a supplementary nature, since the PRC already has a nuclear program dating back to 1960. The program, however, did not foresee the construction of electricity generating nuclear plants which are being planned today. By contrast, the PRC already has 10 small- and medium-sized research reactors, some of them quite sophisticated.

It also recalls that the Brazilian nuclear program was launched in the 1930's but actually implemented in the 1970's, with objectives similar to those of the Chinese program: self-sufficiency in nuclear technology and international cooperation as a means to pursue that self-sufficiency.

The two programs can complement one another, because each one has had a different process of development: Brazil has gained greater experience and has absorbed a degree of nuclear technology in its nuclear industry, a sector that is less developed in the PRC which has developed more basic research and has attained full control of the nuclear fuel cycle.

In addition to the technical, economic, and commercial aspects of the agreement, the note mentions the political aspect by saying that "the importance of the PRC in the context of world politics, particularly in Asia, and Brazil's relevance in the Latin American context and among Third World countries in general, lend special significance to the nuclear agreement signed."

CSO: 5100/2039

BRAZIL

CALS ON NUCLEAR FUEL, URANIUM ENRICHMENT PLANS

PY122359 Rio de Janeiro O GLOBO in Portuguese 11 Dec 84 p 19

[Text] Sao Paulo -- Mines and Energy Minister Cesar Cals on 10 December said that Brazil will attain self-sufficiency in nuclear fuel and will be enriching its own uranium in the early 1990's. He added that investments of \$850 million will be needed every year to master the fuel cycle technology under the nuclear program within the next 6 years.

Minister Cals pointed out that "nothing remains to be changed in the nuclear program." He explained that the program was already subjected to revision when the government decided that the priority target would no longer be the construction of power plants but the mastering of the fuel cycle. Cals remarked that the only pending change is the transformation of Nuclebras into a company that will be independent of the federal government. This company will sell the services of its subsidiaries to third parties both at home and abroad. Those services may be sold by Nuclep (Nuclebras Heavy Equipment, Inc.), Nuclen (Nuclebras Engineering, Inc.), and Nuclemon (Nuclebras Monazite and Associated Elements, Ltd.), which is in charge of exploiting monazite deposits. According to Cals, this will facilitate the obtainment of the \$850 million that the nuclear program will need each year.

On 27 December, Minister Cesar Cals will preside over the start of operations at the Itatiaia mine (which has our country's largest uranium reserve) in Ceara. The mine will be an important step for the attainment of self-sufficiency in nuclear fuel.

CSO. 5100/2042

BRAZIL

BRIEFS

MINING ACTIVITIES WITH LIBYA--Rio de Janeiro--Yesterday in Rio de Janeiro, Khaled Hangari, the official representative of Col Mu'ammar Qadhafi, Libya's chief of state, began negotiations with all the directors of the CPRM (Mineral Resources Prospecting Company) for development and prospecting in connection with new mineral resources in that country. Hangari, who represents his country in the Brazil-Libya joint group concerned with energy and mining, told this newspaper that CPRM technicians were the first to discover uranium in Libyan territory. "Several million dollars will be spent on this prospecting," said Hangari, who recalled that the Libyan Government is interested in exploiting those reserves for peaceful purposes. It was learned unofficially that the uranium was discovered in the southern region between Chad and Niger close to the Central Saharan Mountains. Libya and Brazil have maintained trade and service relations in the field of mining since 1980. The CPRM has already carried out an aerial photogrammetric project. According to sources in the CPRM, sales of services to that country already total \$15 million, and the visit by the Libyan representative may increase those sales as a result of new projects. Hangari said that prospecting for basic metals--copper, iron, potassium, lead, and zinc--will be the object of negotiations by the joint group, and all indications are that the CPRM will be the firm chosen to develop an ambitious mineral prospecting program in Libyan territory. Another item to be included in the negotiations by the mission of five Libyan experts now in Brazil concerns personnel training and aerial geophysics. The Libyans are also interested in opening new wells for underground water in the vicinity of the frontier with Egypt. The total area to be mapped and surveyed by Brazilian experts covers 1,775,000 square kilometers. [By Sergio Danilo] [Text] [Sao Paulo GAZETA MERCANTIL in Portuguese 6 Nov 84 p 14] 11798

ANGRA I COMMERCIAL OPERATION--The president of Furnas Electric Powerplants, Licinio Seabra, said yesterday in Luanda that as of 1 December the Angra I nuclear powerplant should go into the commercial operational phase with its maximum output of 600 megawatts. By that time, he declared, transmission line acceptance tests should have been completed. Licinio Seabra added that the powerplant will go into operation at "the right time" since the Furnas system is operating at a 60-percent capacity because of the prolonged drought in the Minas Gerais region where its powerplants are located. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 27 Nov 84 p 27] 8908

**FLUIDIZED BED REACTOR MODEL--Porto Alegre**--The first prototype of a fluidized bed nuclear reactor with totally national technology, developed in the Department of Nuclear Engineering of the Federal University of Rio Grande do Sul (UFRGS) by a team coordinated by Farhan Sevidvash, will be the great attraction of the Eberle S/A--Industry and Technology exhibit at the Fourth International Informatics Fair starting next week in Riocentro. All the moving components of the reactor are activated by electrical motors which are responsible for the operation of the pump, valve and hydraulic controls operated by programmable logic controllers manufactured by BCM Engineering. Professor Sevidvash and his team worked for 5 years developing the nuclear reactor project, which has in its fluidized bed the great secret of its greater safety compared to the others existing in the world. [Text] [Rio de Janeiro O GLOBO in Portuguese 2 Nov 84 p 13] 8908

**NUCLEBRAS FUNDS APPROVED--Brasilia**--NUCLEBRAS [Brazilian Nuclear Corporations, Inc.] will not have to stop construction work in Rezende, Rio de Janeiro on its pilot enrichment plant or the Angra 2 and 3 nuclear powerplants: SEPLAN (Secretariat of Planning) yesterday approved a 326-billion-cruzeiro increase in the firm's budget for 1984. The budget had previously totaled 1.074 trillion cruzeiros and had been calculated on the basis of an average inflation rate of 75 percent. Although the new ceiling on expenditures by NUCLEBRAS (1.4 trillion cruzeiros) does not offset inflation, it will make it possible for the work to continue. To keep up with the inflation rate of 166.6 percent through October, SEPLAN would have had to authorize an increase from 1.074 trillion to 2.38 trillion cruzeiros. NUCLEBRAS will now be able to assume the contract for 9.136 million deutsche marks that was signed in October 1979 between FURNAS [Furnas Electric Powerplants, Inc.] and a consortium of insurance companies headed by the Alliance Insurance Corporation of the FRG in connection with the Angra 2 nuclear powerplant. Construction of that plant was begun by FURNAS and later taken over by NUCLEBRAS, which will now be fully responsible for the financial commitments made by FURNAS. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 1 Nov 84 p 32] 11798

**URANIUM MINING AID TO LIBYA--Khaled Hangari**, the official representative of Col Mu'ammar Qadhafi, Libya's chief of state, has begun negotiations in Rio de Janeiro with the full board of directors of the CPRM (Mineral Resources Prospecting Company) for development and prospecting in connection with new mineral resources in that country, where the company's technicians were the first to discover uranium. The uranium was discovered in the southern region between Chad and Niger close to the Central Saharan Mountains. Libya and Brazil have maintained trade and service relations in the field of mining activity since 1980, and the CPRM has already carried out an aerial photogrammetric survey. According to Salvador Mandim, chairman of the CPRM, sales of services to that country already total \$15 million, and the visit by the Libyan representative may increase those sales as a result of new projects. [Text] [Brasilia CORREIO BRAZILIENSE in Portuguese 8 Nov 84 p 15] 11798

ITATIAIA URANIUM EXPLOITATION--Brasilia--Itatiaia, in the municipality of Santa Quiteria, Ceara, the largest uranium deposit in Brazil and one of the largest in the world, will be exploited by the Brazilian Nuclear Corporation (NUCLEBRAS) in an agreement with PETROFERTIL, a company connected with the Brazilian Petroleum Corporation (PETROBRAS) which specializes in the area of fertilizers. The agreement which will begin the cooperation of the two companies in the utilization of Itatiaia (PETROFERTIL will participate in the exploitation because the Ceara uranium is associated with phosphate, an important mineral element used in agriculture) will be signed this Friday in Fortaleza at a ceremony which will be attended by Mines and Energy Minister Cesar Cals. The two state companies will make a wide-ranging technical feasibility study regarding the exploitation of the deposit, estimated today at 142,500 tons despite the fact that it embraces only three of the various areas with an incidence of uranium already investigated. For that reason, mineral sector experts believe that that reserve is much larger than the present estimates. Preliminary data of the Ministry of Mines and Energy indicate that that first phase of cooperation between NUCLEBRAS AND PETROFERTIL will require investments in the order of \$12 million. To date, NUCLEBRAS has already invested \$20 million in geological studies in the region, mineral research and laboratory studies pertaining to the Itatiaia reserves. [Text] [Sao Paulo GAZETA MERCANTIL in Portuguese 18 Oct 84 p 11]  
8711

CSO: 5100/2023

NUCLEAR ENERGY INSTITUTE LACKS FUNDS

PY281817 Lima Cadena America Television in Spanish 0330 GMT 28 Nov 84

[No video available]

[Text] The president of the Peruvian Institute of Nuclear Energy (IPEN), Juan Barreda, today said that if the Economy Ministry does not increase the IPEN budget by a billion soles, the institute will possibly have to close down in June next year.

[Begin Barreda recording] The problem is that the IPEN has an estimated 1.58 billion soles deficit for its 1985 payroll. We have already reported this to the government through the energy and mines minister, who has personally discussed our case with the Congress Budget Committee. The economy and finance minister is also aware of our problem.

We do not wish last year's situation to be repeated again this year. We have asked for a billion soles increase in our budget as well as a directive ordering IPEN's reorganization in order to adapt our personnel to the needs of the institution. Unfortunately, our request was not approved and we are now suffering the consequences you all know about.

This year we are in a similar situation and that is why we insist on having those 1.58 billion soles included in our payroll as well as the directive authorizing the reorganization of IPEN. This is the only way in which we can pay our personnel, who represent the backbone of the whole project. [end recording]

CSO: 5100/2041

BANGLADESH

UN DELEGATE SPEAKS IN FAVOR OF TEST BAN TREATY

Dhaka THE BANGLADESH OBSERVER in English 31 Oct 84 p 12

[Text] NEW YORK, Oct. 30:--Bangladesh is irrevocably committed to the general and complete disarmament and have consistently supported the comprehensive test ban treaty; reports BSS.

This was stated by Foreign Secretary and leader of delegation, Mr. Faruq Ahmad Choudhury; during a general debate in the General Assembly Committee on Disarmament and International Security at the U.N. headquarters here today.

Mr. Choudhury described the unprecedented build-up of the most sophisticated and lethal weapons in the arsenals of the super-powers and other militarily significant states as the greatest threat to the very survival of mankind.

The Foreign Secretary said that in spite of its firm conviction that there would be no durable peace except through the elimination and destruction of nuclear weapons and its stockpiles, Bangladesh had acceded to the nuclear non-proliferation treaty in 1979.

The Foreign Secretary referred to Bangladesh's initiative along with six other countries of the South Asian region to promote peace and stability in the region through forging collective self-reliance for the common self-reliance for the common benefit of their peoples and said that this effort toward closer South Asian Regional Cooperation (SARC) had borne fruit.

He expressed satisfaction that Bangladesh had been selected as the venue for the first SARC Summit to be held in the last quarter of 1985.

CSO: 5150/0008

BANGLADESH

BRIEFS

RADIOISOTOPE PROGRAM AIDED--Bangladesh Atomic Energy Commission (BAEC) will receive Taka one crore and a half worth of equipment for its radioisotope production programme from International Atomic Energy Commission (IAEA). German Democratic Republic will supply the equipment through IAEA technical assistance programme. An agreement has been signed in Dhaka on Monday between the visiting representatives of IAEA, GDR and Chairman of BAEC. Radioisotopes are regularly used in the six nuclear medicine centres of BAEC where a large number of patients attend for diagnosis and treatment according to a statement of BAEC. Bangladesh Atomic Energy Commission has started a programme for local production of radioisotope using the atomic research reactor under construction in atomic energy research establishment Savar to meet the national demand as far as possible. In addition to the research reactor special laboratory and sophisticated equipment are also required for the production of radioisotopes. A multi-year technical assistance programme was worked out in 1982 between IAEA and BAEC for this purpose. The equipment to be supplied by GDR is expected to arrive Bangladesh in early 1986 when the reactor would go in full operation. [Text] [Dhaka THE BANGLADESH OBSERVER in English 6 Nov 84 p 6]

CSO: 5150/0009

## AEC CHAIRMAN DELIVERS SAHA MEMORIAL LECTURE

Calcutta THE TELEGRAPH in English 13 Nov 84 p 2

[Text]

Calcutta, Nov. 12: "It will be at least 50 years before controlled thermonuclear fusion will aid commercial power generation, even in advanced countries like the US or UK," Dr Raja Ramanna, chairman of the Atomic Energy Commission (AEC) and secretary of the department of atomic energy (DOE), said while delivering the 24th Meghnad Saha Memorial Lecture here today.

Dr Ramanna, who dwelt in depth on what he called "the immediate technological snags" of producing fusion power, said there was no doubt that the immediate nuclear energy option had to be based on fission, rather than on fusion. According to him, the most formidable impediments in realising fusion power could be surmounted only after very sophisticated developments in metallurgy as well as nuclear science. "Such developments entail large capital investments in research and development," he said, adding, "that is why, before taking a plunge into highly technical research, we in India have to think twice about the tangible results that will accrue to the tax-payers' money."

Speaking on "The prospects of fusion power," Dr Ramanna, however, admitted that among the possibilities in the field of nuclear energy, fusion is to be the most promising.

was "almost inexhaustible" and free from "biological hazards." But he warned against being optimistic about its feasibility and said, "Even pioneers like Dr Homi Bhabha prophesied, as early as in 1955, that we will be able to exploit the fusion source in 20 years. Unfortunately, we are nowhere near that possibility now. Mankind has sufficient technology for realising fission power only after 35 years of the beginning of commercial generation through that process."

According to him, mathematical equations linked with fusion energy often "looked easy to appeal" but, so far as commercial generation was concerned, "it is not the theoretical part that posed problems but the technological aspects that proved troublesome."

Dr Ramanna enumerated the technological advancement attained in this regard in the US, USSR, UK and Japan, where powerful laser beams, beams of charged particles, have been built for experimental purposes. "India too, has undertaken a modest fusion programme in which machines for releasing laser beams have been installed at the Bhabha Atomic Research Centre (BARC) in Bombay." He said all the research work in this regard would soon be transferred to the Centre for Advanced Technology in Indore with a view to "lessening the burden on

the BARC." According to him, the sole aim of the Indian programme was to carry out scientific investigation in fusion and related areas, and to train manpower. "This will ensure that when the time comes to harness fusion energy, India will have the necessary base to take advantage of the new technology," he added.

Dr Ramanna, who was described as "the architect of nuclear India," by the Saha Institute of Nuclear Physics, reiterated the DOE's stand to achieve the target of 10,000 megawatts of nuclear power by 2000 AD. "This is based on indigenous experience, gained over the last several decades in a wide spectrum of activities, ranging from exploration and mining of uranium to design, construction and commissioning of nuclear power stations," he said.

After the lecture, the vice-chancellor of Calcutta University, Dr Santosh Bhattacharya, presented him with a plaque on behalf of the Saha Institute. Later, responding to newsmen's queries, Dr Ramanna said West Bengal's demand of having a nuclear power station in the next five-year plan was being considered. He said, "The AEC will not be able to say anything concrete before the new Prime Minister, Mr Rajiv Gandhi, is apprised of detailed plans for the next decade."

CSO: 5150/0010

RAMANNA: NO NEED FOR HIGH ENERGY IMPORTS

Bombay THE TIMES OF INDIA in English 20 Nov 84 p 9

[Text] Pune, November 19--Dr Raja Ramanna, chairman of Atomic Energy Commission, said here today that there was no necessity for India to import high energy materials used in mining, quarrying, construction and specialised jobs such as metal-cladding and military applications. This was because Indian researchers were continuously updating high-explosive technologies.

Inaugurating the five-day national seminar on high-energy materials, Dr Ramanna said the researchers' efforts were fully meeting the country's defence requirements also. He said military application was a critical and crucial area, where high-energy materials had an indispensable role.

However, with the ever-increasing complexity and sophistication in all weapons ranging from rifles to ballistic missiles, continued research in the field was necessary.

Dr Ramanna appeared moved when he referred to the assassination of Mrs Indira Gandhi, in which a stengun was used. He pointed out that so much technology had gone into the making of the sten-gun, but unfortunately the weapon fell into the hands of a maniac.

He noted the extent to which religious madness could go and said: "We still have a long way to go."

Dr V.S. Arunachalam, scientific adviser to the defence minister, said defence research organisations have developed precision-targeted "intelligent" weapons and the day was not far when they would start the era of precision-targeted "brilliant" weapons. "Our enemies should take note of this before venturing into an aggression," he said.

Dr K.R.K. Rao, chairman of the High-Energy Materials Society, said the seminar would be dedicated to the memory of Mrs Gandhi.

A number of scientists from the U.S., the U.S.S.R., the U.K., West Germany and Switzerland are attending the seminar organised by the society.

CSO: S150/0011

INDIA

BRIEFS

ENERGY: JAPAN WILLING TO ASSIST--Japan has expressed its willingness to cooperate with India in the field of the nuclear energy program. This was conveyed by the vice president of the Tokyo Chamber of Commerce and Industry and leader of the high-level Japanese economic mission, Mr Goro Koyama, during his meeting with the secretary in the Department of Power, Mr S. Venkataraman, in New Delhi yesterday. Mr Venkataraman welcomed the Japanese consultancy services in the renovation of 35 power stations. Petroleum Secretary Mr A.S. Gill, who also attended the meeting, welcomed Japanese collaboration in the construction of offshore platform, drill ships and allied equipment. [Text] [Delhi Domestic Service in English 8 Dec 84 p 3]

CSO: 5100/4715

U.S. POLICY ON NUCLEAR TECHNOLOGY SAID CONTRADICTORY

GF101310 Karachi JASARAT in Urdu 1 Dec 84 p 3

[Editorial: "The Superpowers' Partiality"]

[Excerpts] Before their departure from Islamabad, the visiting U.S. senators said at a press conference: We do not wish to see nuclear arms anywhere in the world, much less in Pakistan. This is indeed a welcome attitude. Every peace-loving person wishes for the destruction of the world's most lethal weapons.

Now if the superpowers are apprehensive about the proliferation of nuclear arms, this does not mean that they consider world peace endangered. If they did they would stockpile huge arsenals which could easily destroy the whole world. If they are so sincere in their wishes they should destroy their own arsenals first. Otherwise their fears are those of a person who has a cannon and fears one who has a pistol!

The same countries are supplying nuclear technology to their favorite countries and are bowing down to the wishes of those who have succeeded in obtaining nuclear technology. For example, the United States continues to threaten Pakistan not to acquire nuclear technology, but gives assistance to Israel for the same purpose. Similarly, India exploded a nuclear device in 1974, but the United States is still prepared to provide it the latest technology, knowing full well that the weapons manufactured by India will be used against that neighbor which the United States considers its ally. It professes friendship with the Arabs and at the same time continues to back Israel. How long will this contradiction in policy continue? The time has passed when the lesser powers could be duped.

The senators have said that Pakistan is surrounded by dangers and that the United States will continue to assist it in strengthening its defense. But can Pakistan's defense be strengthened by oral assurances and applause? Or have the U.S. senators forgotten that it also concerns weapons, which are manufactured in the country and for which technology is necessary, and which is being provided to India but not Pakistan. If, to the United States, the strengthening of defense means giving some light weapons to Pakistan or signing agreements "promising" to help in the hour of need, then we have already had the bitter experience and we know that begged and borrowed weapons do not strengthen a country's defense.

The U.S. senators have also admitted that they believe Pakistan's assurance that Pakistan has not made any nuclear device and never will. Now that the United States has accepted this, what harm is there in providing nuclear technology to Pakistan so that Pakistan can meet its energy requirements? We think these are merely lame excuses. The United States will have to adopt a clear attitude so that it can retain some confidence from its allies.

CSO: 5100/4716

MOSCOW'S DISAPPROVAL OF PAKISTAN'S NUCLEAR PROGRAM ANALYZED

Islamabad THE MUSLIM in English 19 Nov 84 p 4

[Article by Syed Rifaat Hussain]

[Text]

In marked contrast to its explicit endorsement of India's nuclear programme, Moscow has displayed an attitude of condemnation towards Pakistan's quest for nuclear power. In recent years Soviet analysts have described Pakistan's nuclear programme as "fraught with dire consequences for neighbouring states" which has the "aim of turning Pakistan into a base for launching aggressive actions against the USSR."

**COERCIVE DIPLOMACY**

In an important speech last year, Marshal Gorshkov, Commander of the Soviet Navy, mentioned Pakistan as one of the bases of "aggression" which U.S. imperialism had allegedly set up to threaten the Soviet Union. These statements of the Soviet leadership can be interpreted as nothing more than an exercise in coercive diplomacy primarily aimed at inducing a change in the current pro-American tilt of Pakistan. Yet such a reading of Moscow's verbal behaviour will be too simplistic, if not outright wrong. If it seems plausible to argue that the Soviet leadership is capable of rational behaviour and is reasonably accurate in its assessments of potential dangers to its security, then these Soviet pronouncements *vis-a-vis* Pakistan's nuclear power programme must be indicative of something which goes beyond mere rhetoric.

How does one then explain Moscow's vehement criticism of Pakistan's pursuit of nuclear power? Several explanations can be adduced. It can be maintained that Soviet opposition reflects Moscow's general antinuclear proliferation stance. Being one of the several select nuclear powers, the Soviet Union has a vested interest in restricting others in joining this exclusive club. Such a view would not explain why Moscow has favoured the Indian aspiration for nuclear status. Another explanation may relate Moscow's opposition to Pakistan's nuclear power programme to the overall conflictual state of relationship between the two countries. There are indeed serious political disagreements between the two countries on a range of fundamental issues (e.g. Afghanistan) and Moscow is bound to voice its "political" disapproval of something which is a matter of vital importance to Islamabad. This argument maintains that Moscow's apprehensions about Pakistan's nuclear option are largely politically motivated and as a matter of fact a nuclear Pakistan poses no significant security threats to the Soviet Union whatsoever. The problem with this explanation is that it ignores the military dimension of Pakistan's nuclear programme in terms of its role in the Soviet calculus of deterrence.

**POTENTIAL TROUBLE?**

In the absence of a Pakistani nuclear doctrine it is difficult to assess the ways in which a

nuclear Pakistan can be a source of concern to Moscow. As pure speculation one can offer several comments. Historically, the Soviets have always reacted negatively to any development on their borders which smacks of potential trouble. Khruschev is on record as having planned to eliminate the U.S. controlled air base in Peshawar should nuclear war break out between the two countries. The thought of a nuclear Pakistan allied with the Chinese and American nuclear forces could prove nightmarish for the Soviet leadership. This is not to argue that a nuclear Pakistan will, of necessity, be a natural ally of either two of Moscow's arch enemies. This is merely to suggest that in the context of the central triangular nuclear interactions of Washington-Peking-Moscow, the emergence of a nuclear Pakistan is a significant factor which the Soviet leadership cannot afford to ignore. The Soviets frequent allegations of Washington and Peking "ganging up" on Moscow only underscore their sensitivities to such a scenario. The existence of a nuclear Pakistan could, furthermore, complicate all Soviet nuclear-war planning. The Soviet experience with the French and the British nuclear forces in the European theatre could prove decisive in shaping Moscow's perception on this issue.

Finally, a nuclear Pakistan is much too close to the Soviet hinterland where the bulk of its industrial power is located. Considering that an overwhelming proportion of the Soviet strategic nuclear forces is landbased and is increasingly vulnerable to a new generation of weapons such as the Cruise Missile, it may appear disconcerting to Moscow to visualise in a nuclear Pakistan another source of potential threat. If our speculation is correct, it is not too far fetched to think that a nuclear Pakistan may have significant military impact on Moscow's strategic view of Pakistan. Going by the same logic one can make the argument that a nuclear Pakistan which is friendly to Moscow is a strategic asset that can play an important role in helping Moscow secure a more advantageous position vis-a-vis its enemies both in the global and the regional contexts. After all how many nuclear allies does Moscow have outside the Warsaw Pact countries?

CSO: 5100/4717

AFRICAN EFFORTS TO HALT NUCLEAR THREAT REPORTED

Addis Ababa THE ETHIOPIAN HERALD in English 1 Nov 84

[Article by V. Katsman]

[Text]

The laws of physics and biology say that the application of even a part of the existing stockpiles of nuclear weapons will inevitably give rise to the processes that will embrace the entire world with the most pernicious effect on man in the remotest corners of the planet. This is why the imperialists' mounting bellicosity, building up the threat of a world nuclear holocaust, causes ever stiffer resistance on the part of the peace-loving forces, the movement for the removal of the nuclear threat and against the arms race imposed upon the world is gaining in scope and intensity on all continents. All those who cherish our planet have joined the action. Among the peace champions the peoples of the African continent have been ever more conspicuous.

Back in the 1960s the newly-free African states condemned the nuclear weapons tests staged by France in the Sahara desert. African countries voiced the initiative at the UN General Assembly to make Africa a nuclear-free zone.

In subsequent years representatives of African states denounced the

arms race at various international forums. The African press invariably urged stepping up the drive for peace. Many periodicals harshly criticised the imperialists' nuclear ambitions.

At present the anti-war movement has become still more active and offensive. From individual measures on the state level, it has developed into massive, nation-wide movements.

The words condemning the aggressive course of imperialist powers and their striving toward world supremacy through nuclear weapons sound from the pages of the leading periodicals in Ethiopia, Congo, Angola, Madagascar, etc. The leaders of African states put forward their appeals for peace and nuclear disarmament from the high rostrums of the United Nations, the Organization of African Unity and other international forums.

This is an indication of the African peoples' growing awareness of the danger of the nuclear arms race. The public protest is also gaining momentum. Many countries have seen the appearance of peace committees and marches, meetings and demonstrations

against the imperialist policy of nuclear threat and the evavement of new systems of weapons. Thus, in December 1982 Ethiopia's Committee for Peace, Solidarity and Friendship called upon all the people of good will to mobilise their efforts in the struggle against the deployment of neutron weapons, new American medium-range missiles, in Europe for an immediate curtailment of the strategic weapons stockpiles.

In the recent days manifestations for peace and disarmament have been staged in Addis Ababa, Bissau, Brazzaville, Bamako, Luanda, Maputo and other African capitals. In Ethiopia and Angola the peace gathering has become the working people's traditional annual action against the threat of a nuclear catastrophe. In 1983 a peace week was held in Mali. Congo was the venue of the first conference of the central African peoples' peace movement attended by delegations from Angola, Zaire, the Central African Republic, Gabon and Chad.

In March 1984 Nigeria witnessed a nationwide peace action with mass rallies and demonstrations. Central

to it was the meeting at the institute of international relations in Lagos. In their speeches public figures and scholars censured the policy of nuclear blackmail pursued by the American administration. The speakers noted that the US is whipping up war hysteria which threatens the world with a nuclear disaster to devour the entire African continent as well.

Resolutely condemning the imperialists' nuclear ambitions, African peoples support the all-round fight for disarmament and peaceful co-existence that is being waged by the socialist community. Their peace initiatives have received backing from such authoritative African leaders as Comrades Julius Nyerere, Mengistu Haile-Mariam, Jose Eduardo Dos Santos, Samora Machel, Jerry Rawlings, Didier Rata-raka and others.

Africa's protest against the imperialist policy leading to a nuclear war is being ever more militant. New forces are joining the anti-war movement in the attempt to prevent a nuclear holocaust. African peoples grow ever more conscious that the fight against the threat of a new world war is one of the conditions of its prevention.

CSO: 5100/6

SOMALIA

BRIEFS

BRAZIL URANIUM CONTRACT--Brazilian companies are close to signing a contract to build a \$300 million uranium extraction and concentration plant in Galgudud, according to industry sources in Rio de Janeiro. "We hope to sign this year", Jose Eduardo Goncalves Gutierrez of Constructora Andrade Gutierrez--the country's third-largest construction company--said. Executing agency for the project is the Somali Arab Mining Company (Soarmico), established in 1975, which is one-third owned by Amman-based Arab Mining Company (Armico). [Text] [Paris AFRICAN DEFENCE JOURNAL in English Nov 84 p 26]

CSO: 5100/10

## SOUTH AFRICA

### INTERNATIONAL NUCLEAR WASTE DUMP CONSIDERED

Johannesburg THE STAR in English 29 Nov 84 p 1

[Article entitled: "SA May Be World Nuclear Dustbin"]

#### [Text]

Nuclear authorities in South Africa are considering making remote areas of the country international "burial sites" for radioactive waste.

They believe South Africa's large open spaces and arid conditions are ideal for an atomic dumping ground.

This emerged at a Press conference at Vaalputs — the area zoned to be the burial site for Koeberg's atomic waste. It is in Bushmanland, about 100 km from Springbok.

#### Contamination

Dr J P Hugo, managing director of the Nuclear Development Corporation of South Africa (Nucor), said South Africa's low rainfall and large, arid, sparsely populated areas spared the country the problems faced by many others when it came to disposing of waste products.

Other nuclear countries were highly populated and had to set aside valuable and urgently needed land for dumping.

In those with high rainfall, there is the added risk of waterborne radioactive contamination and the increased possibility that the metal containers used as nuclear coffins could rust.

#### Earn billions

It was pointed out that if South Africa were to allow an international burial ground it would earn the country billions in foreign exchange.

But Dr Hugo said that while burying the world's atomic waste could earn billions, he did not think South Africans would accept the idea.

It could have the country tagged as the nuclear dustbin of the world, and he did not think this would be accepted.

At present, all South Africa's high-level radioactive waste products from Koeberg are being exported to be reprocessed and the country doing the reprocessing is responsible for the final waste product.

CSO: 5100/9

MINTEK OFFICIAL PREDICTS UPTURN FOR URANIUM

Johannesburg MINING WEEK in English 21 Nov 84 p 3

[Article by Val Pienaar]

[Text]

**INCREASING** public resistance to the use of nuclear-powered energy (and weaponry) in recent years has brought the price of uranium plummeting from a high of some 43 dollars a pound in 1978/79 to its current less than 18 dollars a pound — but Mr Henry Simonsen, head of the professional services division at Mintek, believes an upturn will occur in the foreseeable future.

"The dramatic growth curves experienced when nuclear energy first took off could not be sustained and in fact declined sharply in the face of public opposition," he recalled.

"However not all countries have restricted developments in this area — France being a case in point — and their demands for uranium are growing."

"Natural erosion of existing inventories, brought about by the shutdown of many plants in the world, will also contribute to a growing demand for uranium."

"I believe that by the 1990s uranium will have returned to its previous high, in terms of market

price," Mr Simonsen said.

He pointed out that, once this upturn went underway, South Africa was well equipped to benefit from it.

"South Africa produces some 6 000 tons of the world's 45 000 tons of total uranium production, following Canada as the third biggest producer after the US."

"Our production costs are towards the lower end of the world scale, thanks to the fact that South Africa's uranium is a byproduct of its gold."

"This makes us more competitive than many US and Canadian producers."

In Canada, he said, some ores were of such high grade that even their tailings rated as radiological hazards.

By contrast, the average grade of ore milled from the Witwatersrand Supergroup was only 0.028 percent. This could be justified mainly by the quantities of ore milled — this region produced some 60 percent of the world's gold, he said.

A further point in the favour of local uranium producers, Mr Simonsen said, was the extent of South Africa's reserves.

According to *Uranium: Resources, production and Demand* — a joint report by the OECD Nuclear Energy Agency and the International Atomic Energy Agency — South Africa's resources in the "reasonably assured" range total 313 000 tons, of which 191 000 are in the 80 dollars-a-kilogram range.

Only the US, with 407 200 tons, and Australia, with 336 000 tons, exceed these reserves.

In the "estimated

additional resources" category (categories I & II) South Africa has 147 000 tons, the US has 891 700 tons, Canada has 510 000 tons and Australia has 394 000 tons.

According to Dr Simonsen, South Africa has been involved in the development of extraction processes from the early days of project manhattan.

Professor Bain of Amherst College and Dr Davidson of the UK Geological Survey conducted an underground survey of South African gold mines, using a Geiger counter, to assess the potential of gold ores as a source of uranium supply for weapon manufacture.

Co-operative work involving the government Metallurgical laboratory (GML) and laboratories in the US and UK followed, culminating in a pilot plant at the GML in 1948.

This was followed by pilot plants at Blyvooruitzicht in 1949 and at Western Reefs in 1950.

CSO: 5100/9

SOUTH AFRICA

BRIEFS

KOEBERG SAVINGS--LOADING of the second unit at Koeberg nuclear power station has started, and both units should be generating at full capacity by the middle of next year. Escom has released figures showing the tremendous savings achieved in coal, water and transport by the first unit from April 4 to September 6. In this period, the unit produced 2-billion kilowatt hours, equivalent to burning a million tons of coal in one of Escom's Transvaal power stations. Koeberg consumed only 131kg of uranium 235, which is 7,5% of the uranium 235 in the reactor. About 4,6-billion litres of water would have been lost by evaporation if the same quantity of electricity had been generated at a coal-fired station inland. A coal-fired station in the Cape producing this quantity of electricity would have transported a million tons of coal, requiring 630 trains, each with 33 wagons. Trains to transport this quantity of coal would be more than 500m long. The quantity of water saved is equivalent to 15% of the capacity of the Steenbras dam, which supplies the Cape Town metropolitan area. A million tons of coal burned in a coal-fired station would involve the disposal of 400 000 tons of ash. As with the first unit, the second unit will undergo extensive tests after approval by the Atomic Energy Commission. It will start generating slowly, with tests at different stages. There will then be further tests before Escom takes over the station from the contractors. [Text] [Johannesburg RAND DAILY MAIL in English 21 Nov 84 p 8]

CSO: 5100/6

## RADIOACTIVE SAHARAN SAND COVERS MANY AREAS

Paris le FIGARO in French 12 Nov 64 p 36

[Article: "Radioactive Sand Over Paris"]

Text: The entire Parisian region as well as extensive sectors of French territory were covered, during the night of Friday to Saturday, by a fine layer of Saharan sand whose "instantaneous radioactivity" was "relatively high," but "without, however, any effect on the public health," it was learned from the CENIS (Central Protective Service Against Ionizing Radiations).

On Saturday, many French citizens, particularly in Ile de France, found the vehicles they had parked in the open air, spotted with patches of reddish brown dust.

The National Weather Service was able to indicate immediately that it was a very fine layer of sand from the Sahel and Saharan regions, particularly from Libya...

Heavy sandstorms occurring in those regions a few days ago had hurled a sizable quantity of red sand into the upper atmosphere. A portion of this sand, consisting of the finest grains of silicon and hovering at an altitude of 10,000-15,000 meters, was borne by winds blowing from the center of Africa towards the Mediterranean, after having crossed the North African Atlas mountain chain, arrived over the Atlantic.

There, captured by the moist air masses, these sands were carried towards French territory and were precipitated by the rains.

(National Weather Service)

The phenomenon of Saharan winds being transported over Europe is not a new one. It occurs periodically, once every 2 to 3 years on average, when the combination of meteorological conditions favors it. A few years ago, some of this sand was even found in Scotland.

As for the radioactivity exhibited by the sand that fell on Friday exactly between 1930 and 2040 hours, it will owing, according to SCPRI experts, to

radon, a radioactive gaseous component that is released particularly over uranium deposits and certain quantities of which are found in the atmosphere.

The SCPRI maintains a constant radiological environmental watch throughout French territory, by means of an extensive network of stations that continuously analyze samples of atmospheric dusts, of inland waters, of decantation sediments, etc. It was thus able to determine very rapidly a deposit of the order of 100 milligrams of sand per square meter, or 100 kg per square kilometer...

The instantaneous radioactivity of the deposit was measured at 10 millicuries per square kilometer, of short-half-life radioactive elements, principally radon. One millicurie is 1/1000th of a curie, a unit of radioactivity corresponding to 37 billion of disintegration per second [as published].

The SCPRI makes it a point to emphasize that the momentary radioactivity--since radon disintegrates very rapidly--produced Friday night in France "was very much below the danger threshold."

9238

CSO: 5100/2520

PLUTONIUM FUEL USE IN LIGHT WATER REACTORS PROPOSED

Paris LIBERATION in French 15 Nov 84 p 21

[Article by D. L.]

[Text] A new use for plutonium. There was use for it in bombs and in the core of breeders, those nuclear plants that are still in the experimental stage. And there will soon be in conventional light-water plants, the type most widely built throughout the world. To date, the fuel used in the latter has consisted essentially of slightly enriched natural uranium.

The problem is that, for the past several years, the accumulation of plutonium in the plants that reprocess the fuel burned in power-generating plants has grown. Some use has had to be found for it. Until very recent months, it was continually being declared officially that this plutonium would be used in breeder reactors. But this line of development is now running behind schedule. Super-Phenix, the biggest of the current French projects will start perhaps next summer, thus not entering its industrial phase until some time in 1986 at the earliest... What then is to be done? Stop the reprocessing, one of whose principal justifications eventually became precisely the obtention of plutonium? This would be much too damaging a blow for COGEMA and its plutonium operations. At a time when a new facility is being built at the Hague plant, it cannot suddenly be made to appear--even partially--useless. Second possibility: Stockpile plutonium. Too dangerous an intermediate-term solution. To handle this encumbering material, the best solution has been found to be a change of "trash cans"; that is, the transferring of its planned use in breeders, now running behind schedule, to power-generating plants already in place.

One following closely upon the other, COGEMA [General Nuclear Materials Company (French)] and Belgo-Nucleaire (Belgian), on the one hand, and British Nuclear Fuel (British), on the other, have announced, within days of each other, that they are going to market a mixed-uranium-plutonium fuel. This past Thursday, COGEMA and Belgo-Nucleaire signed a contract to form a joint GIE (economic interest group), to be called "Comox," to market the fuel. This mixture of traditional uranium with "a small percentage" of recycled (by reprocessing) plutonium is the result of 3 years of joint research. It will be produced in the conventional fuel manufacturing plants, specifically

those of the Franco-Belgian Fuel Manufacturing Company, a subsidiary of Pechiney, COGEMA and FRAMATOME [Franco-American Atomic Construction Company].

COGEMA estimates that a 10-percent saving can result in the kilowatt-hour production cost. Not everyone is convinced of this estimate. Jean Tassard, of the CFDT [French Democratic Confederation of Labor], estimates that this mixed-fuel solution "is not economically interesting. It is a mere claim. The important thing is to finally find a way to make all this plutonium left by reprocessing disappear." And in any case, acknowledging such a saving is tantamount to accepting the logic of reprocessing.

But over and beyond economic considerations alone, the problem that resurfaces as usual in the nuclear domain is that of safety. With this new fuel, intended for conventional power plants, hence to be lugged about throughout just about all of France, the question of means of transportation arises. New classes of containers, of the type of those used to transport irradiated fuel, will undoubtedly have to be adopted. In sum, this new fuel will certainly have to be handled with added precautions, since it presents greater hazards than simple enriched uranium. In other words, the fueling procedures in use today in conventional power plants will then have to be revised.

923H  
CSO: 5100/2520

## COGEMA OPENS JAPANESE OFFICE TO INCREASE COOPERATION

Paris LE FIGARO in French 16 Nov 84 special section p II

[Article by Martine-Amice Matyas]

[Text] Tokyo--France has now strengthened its nuclear presence in Japan with the opening of a permanent COGEMA [General Nuclear Materials Company] liaison office in Tokyo. The ties COGEMA maintains with Japan hark back to the 1960's. In 1974, it negotiated contracts with 10 Japanese firms for the sale of nuclear products, uranium, enrichment and reprocessing, during the 1980's. Today, Japan, which buys \$200 million of products from France, has become France's leading foreign client.

"The opening of this office in Tokyo," said Mr De Vissoq, president of the firm, "is evidence of COGEMA's determination to pursue Franco-Japanese nuclear cooperation, and of the optimism with which we view the development of nuclear energy in this country."

This inauguration coincided with the arrival the same day of a Japanese ship, the "Seishinmaru," which left Cherbourg with a cargo of 288 kg of plutonium dioxide that had been reprocessed by COGEMA for the account of Japan.

After arriving in the port of Tokyo at 0230 hours under the most closely guarded secrecy, the six containers of plutonium were transported by truck, escorted by 15 police cars, to the Tokaimura plant, where they arrived at 1000 hours the same morning. The 300 demonstrators who had come to the port of Tokyo at 0830 hours to protest against this "dangerous shipment, which had arrived surrounded by absolute secrecy and had required intervention by the Army," paraded under a driving rain although the convoy had left a long time before.

Asked by the Japanese press about the responsibility borne by COGEMA for the safety of this shipment, Mr De Vissoq replied that COGEMA's responsibility ended with the departure of the shipment from the port of Cherbourg.

#### Flexible Contracts

It is to be pointed out that the Japanese authorities, referring to the complexity and the cost of transporting this cargo, owing in particular to

fears of a possible diversion of the ship at sea, indicated, the same morning as the arrival of the "Seishinmaru," that, in the future, Japan will insist on reprocessing the nuclear fuel in its own facilities.

But according to Mr De Vissoq: "A reprocessing plant does not become viable if a country uses less than 900 tons of fuel for its nuclear electricity production needs." The president of COGEMA then stated that, in his opinion, Japan will attain this level around the beginning of the 1990's, that is, when it will have some 30 reactors.

For the time being, according to Jean-Pierre Rougeau, sales manager of COGEMA, the French firm plans to negotiate the extension of the present contracts into the 1990's. One of these contracts has already been extended, as of last Tuesday, with the Shikoku Electric Power Company. The representatives of the French firm express optimism as regards the other contracts. They also hope to obtain options for the 1990's on a new type of short-term contracts, called flexible contracts, which will enable COGEMA to deliver additional quantities of reprocessed fuel in accordance with the needs of the foreign client.

Actually, since 1 October, the United States has been authorizing its clients to procure elsewhere up to 30 percent of the quantity of nuclear fuel originally reprocessed by the Americans. Estimating that Japan's annual needs will be between 5 and 6 million UTS [separative work units] of fuel as of the mid-1990's, Mr Rougeau, in sum, expressed the hope that France, for its part, will be able to sell Japan 1 million units and "bite off" some 30 percent of the remaining millions.

9236  
CSO: 5100/2520

FRANCE

BRIEFS

ADVANCED FUEL FOR SWEDEN--Coincident with the announcement of the forthcoming marketing of a uranium-plutonium mixture, an agreement has just been signed between EDF/CEC (French Nuclear Fuel Company) and the Swedish National Energy Office for the supplying of three refuelings of an "AFA" type. The contract, valued at 80 to 100 million francs, provides for the delivery of this "advanced fuel" which, owing to its higher yield, lengthens the periods between refuellings of conventional light-water nuclear power generating plants. [Text] [Paris LIBERATION in French 15 Nov 84 p 21] 9238

CSC: 5100/2576

## NUCLEAR POWER PLANT DECISION, GERMAN FIRM HOPEFUL

Frankfurt/Main FRANKFUTER ALLGEMEINE in German 28 Nov 84 p 16

[Text] Izn. ANKARA, 27 November. By the beginning of December the last round of talks is to take place in Ankara with the Turkish government about the ambitious nuclear power program which goes back to the time of military rule. These days delegations of the three competing groups, the German Kraftwerk Union AG in Muelheim, the Canadian Atomic Energy Ltd. of Canada, and the American Westinghouse Company, are arriving in Ankara with their final offers. In circles close to the Turkish government, the impression prevails that, because of the high indebtedness of the country, there is a desire to postpone the program for a few years. This, it is said, also corresponds to the desires and recommendations of the International Monetary Fund and the World Bank. In the draft budget for 1985, which at the moment is making the rounds in parliament, there is also no item envisaged for the nuclear power program.

However, as transpires in Ankara, the Turkish prime minister, Turgut Ozal, during his last visit in the FRG reportedly was discreetly but emphatically instructed by the responsible ministers to give the order to the Kraftwerk Union. Ozal is reported to have called the attention of Federal Chancellor Helmut Kohl and Federal Minister of Finance Gerhard Stoltenberg to the fact that, because of the limited funds and because of the lack of nuclear exports, the development of a nuclear power program is premature. He indicated that Turkey possesses rich natural energy sources such as brown coal and water and must limit itself to covering its energy needs with brown coal and hydropower plants. To the German industrialists, Ozal reportedly replied: "If this is the way you want it, I am agreed, but under this condition you build the power plant yourself, you operate it yourself, and Turkey will purchase the electric power from you." Since that time this is regarded as the new "Ozal-Model" for foreign investments in Turkey. Ozal summarized in three short words in Turkish: "Yap, istlet, sat": (That is: Build, operate, sell). The difficulty of this model lies in the fact that it seems impossible to fix the price of electricity realistically because of the constant devaluation of the Turkish pound. As transpires from well-informed sources, the Kraftwerk Union, like the other enterprises, is supposedly not willing to agree to the "Ozal-Model".

8970  
CSO: 5100/2523

TURKEY

CANADA'S AECL SEEN IN LEAD FOR AKKUYU CONTRACT

Istanbul DUNYA in Turkish 3 Dec 84 pp 1, 9

[Text] Ankara (DUNYA) - Turkey's choice for building the projected nuclear power plant in the Akkuyu sector of Silifke is beginning to turn in favor of the Canadian firm AECL [Atomic Energy of Canada, Ltd]. According to authoritative sources, the West German firm KWU [Kraftwerk Union] will drop out of the running to build the Akkuyu nuclear power plant "vis-a-vis the Turkish government's attitude on the contract."

While the final date Turkey announced for the Akkuyu plant expired on 30 November 1984, predictions that the contract would be awarded to Canada's AECL gained strength following the contacts in Ankara last weekend by that nation's Defense Minister Robert Coates. In fact, officials of the West German KWU tended to confirm this likelihood when asked about developments. "While the amount of foreign capital coming into Turkey since 1950 has remained at around \$1 billion, it is impossible for KWU to tie up \$2 billion at one stroke in the power plant," according to KWU officials.

Meanwhile, the Economic Affairs Supreme Coordination Council meeting which began on Friday continued yesterday. The council discussed the Akkuyu nuclear power plant, according to information obtained, in addition to the results of the latest reorganization of the State Economic Enterprises.

The "build-sell-run" formula devised by Prime Minister Turgut Ozal was retained as valid for the Akkuyu power plant, for which Turkey has made appropriations from its own resources in the 1985 budget.

With the Canadian defense minister saying that the proposal he brought to Ankara "adheres as closely as possible to this formula," the likelihood increased that the government's choice for the contract would be AECL.

KWU Status

While awaiting the "preference" for the Akkuyu contract, KWU sources have pointed out that 36 percent of the world's nuclear power plants were built using KWU techniques and 4 percent using AECL's. The sources maintain that "the West German firm signifies reliability," while authorities have announced that "if the contract is delayed," the firm will "withdraw" from consideration.

Stressing that "KWU has adopted" Prime Minister Turgut Ozal's "build-run-turn over" formula, sources said in an interview with DUNYA that the amount of foreign capital coming into Turkey since 1950 had been \$1 billion, questioning whether KWU would tie up almost \$2 billion in this deal. They said, moreover, "There is no question of the nuclear power plant's becoming profitable in 5 years."

Reliable sources who were asked about the recent arrival in Turkey of Bavarian former finance minister, Walter Leisler Kiep, said that Kiep was trying to find out in his talks "whether the credit which the German government had guaranteed and is currently blocked would be used" and had told the Turkish government that if it would not be used, the credit "would be transferred to Egypt which wants to build a nuclear power plant."

Indicating that KWU's planned nuclear project in West Germany had been "abandoned owing to the German government's stringent safety conditions," reliable sources said:

"The German government demands the kind of measures that the Turkish government has not demanded at all. The German government wanted a shield over the nuclear plant to protect against airplane crashes. There is no such item in the Turkish government's specifications. If they were to want this kind of thing, the cost would increase even more. While your government cannot cover even a small portion of this kind of cost, we cannot cover it ourselves. Moreover, the enriched uranium that KWU would use is available in 16 or 17 of the world's socialist and capitalist nations. The heavy water that AECL would use is available only in Russia, the United States and Canada. If these three nations were to refuse to supply heavy water, the power plant would become inoperable and production would halt. KWU and AECL have both agreed to supply raw materials for a period of 5 years. The Turkish government will have to worry about it after 5 years. Moreover, Turkey has to get its relations with the EEC in order. West Germany and Britain are the ones standing up for Turkey in the EEC. Germany has the largest parliamentary group in the EEC."

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